SUMMARY

REPORT ON FOREST HEALTH
of the
UNITED STATES
by the
FOREST HEALTH SCIENCE PANEL

A Panel Chartered by:

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PREFACE

Case-by-case management decisions on individual forests are having unintended consequences to forests in other regions and abroad, to the global environment, and to other values people hold. To ensure the consequences are the intended ones, this report presents and analyzes eight policy options for managing public forests and for providing incentives to influence management of private forests in all regions of the United States.

One of these or another consistent forest policy needs to be agreed upon by policymakers before laws, incentives, and management practices can be developed. Otherwise, the various laws, incentives, guidelines, and practices will continue to have contradictory objectives--and different parts of the same law will be used to curtail, accelerate, and otherwise inconsistently alter such practices as species and fire protection and timber harvest.

This report is intended to help policymakers understand the effects of different policies for managing the various forests. It describes the present condition of the forests, eight policy options, and the consequences of each option. Both public and private forests in all regions of the United States are considered because policies on one ownership or region lead to changes in forests of other ownerships or regions--and abroad.

This report follows a "policy analysis" approach to the "forest health" issue. It proposes various options for management of public and private forests and describes the consequences of each option. It does not suggest which option should be followed--and therefore which values are important--since these are the decisions of policymakers.

While a consistent policy is being developed, interim measures may be needed to avoid foreclosing options through loss of infrastructure, habitat, and/or timber. Specific interim measures are not suggested in this report.

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BACKGROUND

Regions

This paper addresses all United States forests--both publicly and privately owned. More than two thirds of the United States' forest land is classified as "productive" (forests capable of growing more than 20 cubic feet of wood/year[1]). Productive forests cover 23 percent of the United States' land area. Another 9 percent of the land area is covered by unproductive forests, primarily in the Inland West and Alaska. Unless otherwise stated, only productive forests are considered in general discussions, specific analyses, and figures and tables.

This report divides the United States into five regions (Figure 1.1):

--The North, including the Northeast and North Central United States,

--The South, including the Southeast and South Central United States,

--The Inland West, also known as the Rocky Mountain region,

--The Pacific Coast,

--Alaska.

The South and North each contain about one third of the 525 million acres of the United States' productive forests (Figure 1.2). The Inland West and Pacific Coast each contain about 15 percent of the productive forests. Alaska contains only about 4 percent of the productive forests.

The South and North each contain very little unproductive forests--10 million and 3 million acres, respectively. The Pacific Coast contains a moderate amount of unproductive forests--26 million acres. The Inland West and Alaska contain the most unproductive forests--65 million acres and 108 million acres, respectively.

Non-industrial, private forest landowners own two thirds of the productive forests in the North and South. Most of the productive forests in the Inland West, Pacific Coast, and Alaska are owned by the Forest Service and other public agencies. Industrial forest landowners own less than 23 percent of the productive forest land in any region of the United States.

Alaska contains the greatest proportion of productive forest land where timber and other commodity management is excluded ("reserves"[2]), with the least proportion in the North and South and an intermediate proportion in the Pacific Coast and Inland West. Forest and non-forest reserves cover about 12

[1] Definition from USDA Forest Service RPA reports. Powell et al. 1993.

[2] The term "reserves" is used to be consistent with the USDA Forest Service RPA reports (e.g., Powell et al. 1993). "Reserves" is ambiguous, since it was originally used to describe areas of timber management, but is recently used to describe areas where timber management is excluded. Another suggested term "preserves" is also ambiguous, since areas excluded from commodity management do not remain stable, or "preserved," but change with growth and natural disturbances.

percent of the United States' total area, primarily in Alaska, the Inland West, and Pacific Coast.

Forest Structures and Habitats

Forests exist in different structures--different sizes, numbers, and arrangements of trees, shrubs, and other organic matter.[3] Forests have always changed among different structures with growth and disturbances. These structures provide habitats for different plant and animal species.[4] For this report, five structures will be referred to (Figure 1.3), although there are gradations among them:

--savanna: park-like areas with widely spaced, large trees with primarily shrubs and non-woody plants between them;

--open: forest openings primarily covered with shrubs and non-woody plants and very small (young) trees;

--dense: forest areas of trees so crowded together that their shade prevents shrubs and non-woody plants from growing on the forest floor;

--understory: forest areas of trees less crowded, so shrubs and non-woody vegetation grows on the forest floor;

--complex: Forests containing a large range of sizes and species of trees, as well as snags, downed logs, and shrubs and non-woody vegetation growing on the forest floor.

(The terms "old growth," "ancient forests," "climax forests," and "LSOG (late-succession-old growth forests)" are avoided in this report, because they have been used at different times to describe forests in the "complex", "understory", "dense", and "savanna" structures. Therefore, these terms do not clarify the issues.)

Different animal and plant species depend on each structure. The savanna, open, and complex structures support the most species, and the dense structure supports the fewest species. Very old and/or large trees (several hundred years) were historically found in many savanna, understory, and complex structures.

Populations

Eighty percent of the United States residents live in urban areas, primarily in the North and South. Alaska and the Inland West contain the fewest residents.

PART #1: WHAT IS FOREST HEALTH?

"Forest Health" has been defined in at least ten different ways to express some of the values people want from forests. (See Appendix A in

[3] For a more complete definition of "structures", see Oliver and Larson 1996.

[4] "Habitat" is also used with slightly different meanings; however, for this report, "habitats" will be considered synonymous with "stand structures."

main document for definitions.) One definition of Forest Health is not more "scientific" than another. They all describe the condition of the forest relative to various values, such as shown in Table 1.1. This report addresses the capabilities of our forests to provide values to people and societies generically, without specific reference to a particular definition.

PART #2: WHAT ARE THE FACTORS WHICH ENABLE OUR FORESTS TO ACHIEVE, OR NOT ACHIEVE, THE VARIOUS VALUES?

Many attitudes and policies during the past century have contributed to the forests' present condition. These factors are based on two perceptions which have since changed:

Change #1. The perception of an impending timber shortage. Conservation concerns and actions beginning over a century ago, combined with transportation and technology innovations, have allowed the people of the United States to avoid this shortage. The forest base has been stable for the past 50 years while the timber volume has been increasing. Some species in some regions--such as southern pines in the South--are being harvested at a faster rate than they are presently growing. Timber is still extremely valuable as an alternative material to more polluting substitutes (e.g., steel, aluminum, concrete, and brick) and more could be harvested in the United States to avoid net importing from other countries.

Change #2. The "steady state" perception of "Nature." Past philosophical and scientific theories of a stable ("steady state") "natural" condition led to attempts to exclude disturbances (e.g., fires) in order to provide such "natural" values as species diversity.

Scientific theory now accepts that forests are constantly changing. Nearly 100 years of fire exclusion (following the previous 8,000 years of human activities) have led to many crowded forests and threatened and endangered species which can not use these crowded forests.

Species diversity can be provided in the forest, but not by attempting to maintain a "steady state" condition.

These two perceptions have led to much of our legal, economic, technical, educational, and social policies and attitudes regarding the forests.

These policies and attitudes need to be reexamined in light of the dramatic changes in these understandings. Before recommending changes in these factors, the present condition of the forests need to be understood. Then, the desired condition of the forest, and the policy approach to achieve it, needs to be agreed upon, so these factors can be changed consistently.

PART #3: WHAT IS THE PRESENT CONDITION OF OUR FORESTS?

The United States' forests are providing the different values to different extents, often with considerable variations among regions (Figure 1.1). Some

of the general conditions of the forests which provide, or do not provide these values are:

- **--The productive forests cover a moderate proportion (23 percent) of the United States' total land area, contain large standing volumes, and could contain a variety of vegetation conditions, and so could provide a large variety of timber, other forest products, habitats, accessible recreation, and rural, non-commodity lifestyles;**
- **--The forests are not under broad pressure of being converted to agriculture, grazing, or other non-forest uses and so can sustain watersheds and productivity.**
- **--Many exotic pests are already in our forests, and others can readily be imported with raw timber products and through other ways;**
- **--Nearly all forest regions have been and will be impacted by non-human disturbances (fires, windstorms, floods, volcanoes, and others);**
- **--The United States is harvesting less than two thirds of the timber it is growing,[5] but is becoming a net importer of wood from other countries--which have fewer environmental safeguards for timber harvest. The United States is also increasingly shifting from wood to steel, concrete, and other products which add much more CO2 to the atmosphere and consume more fossil fuels than wood.**
- **--Very many of the forests are growing in small diameter, overly crowded conditions and different species mixtures compared to previous forests. Without proactive intervention, these forests will not provide high quality timber, or forests which are resistant to catastrophic outbreaks of insects, diseases, and fires. These catastrophes reduce habitat diversity and utilizable timber, and add large amounts of CO2 to the atmosphere. Pro-active intervention to change these conditions is rarely being done.**
- **--Many species which have survived in forests for millions of years are now threatened with extinction, even though they survived eras of intensive forest clearing for agriculture (and later regrowth to forests), fires, and unrestricted harvesting of the previous few centuries. These species are in danger because many regions do not have enough open, savanna, and complex habitats.[6,7] These habitats are lacking because the forests have regrown to disproportionately large areas of the small diameter, overly crowded dense structure as human and "natural" fires of the past thousands of years have been eliminated and other disturbances have not been substituted.**
- **--Most forestry economic segments are not living up to their potential**

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[5] The United States is harvesting about 60 percent of its gross growth (75 percent of net growth). See Appendix G: "Glossary" in main document for definitions of net and gross growth.

[6] For definitions of "structures" and "habitats," see Appendix G: "Glossary" in main document.

[7] The terms "old growth," "ancient forest," and "climax forest" are not used in this report, because the many, conflicting uses of each of these terms makes their meaning ambiguous.

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--Very few proactive steps are being taken to avoid exotic and native pest epidemic outbreaks;
--Opportunities for remote recreation are concentrated in reserves in western regions, and most people live in the eastern regions.
--The very large reserves often serve as foci for catastrophic insect, disease, and fire outbreaks which can spread to other forests.
--Private industrial landowners generally own vigorous forests on productive soils, but only own 13 percent of the United States' forest area;
--Small, non-industrial landowners own a large proportion (55 percent) of the United States' forests, but many of these forests are not vigorous or on productive soils.
--Most of the remaining high quality timber and many areas suitable for non-timber products are unavailable or inaccessible for harvest because they are set aside in reserves (legislative or administratively designated).
--Small, non-industrial landowners generally do not have the economies of scale or financial abilities to undertake long term investments or to avoid taxes (e.g., estate taxes) or other regulations which discourage long term forest management.
--Forests of the Inland West, Pacific Coast, and Alaska are a high public cost because the public forests are concentrated in these regions with inefficiencies of government management, non-commodity values to be provided, and large reserves managed with no commodity removal.
--All regions except the South have a low ability to recover from catastrophic, natural disturbances (fires, windstorms, and others) because these other regions have large forest areas without the infrastructure of roads, logging equipment, and/or trained personnel to salvage and otherwise "restore" forests after "natural" catastrophes.
--Forest regions in the West are not providing rural commodity and non-commodity lifestyles very well because very large reserves contain much of the remaining high quality timber as well as large volumes and desirable species. These reserves also contain few roads, but serve as foci for catastrophic insect, disease, and fire outbreaks which can spread to other forests.
--Different regions are harvesting different proportions of their growth, with the South harvesting the greatest proportion and the North, Inland West, and Alaska harvesting the least.

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PART #4: WHAT ARE THE ALTERNATIVE APPROACHES AND POLICY OPTIONS TO MANAGING OUR FORESTS?

To keep specific laws which pertain to forest management from becoming contradictory, it is first important for policymakers to agree on general policies for managing the different forest lands.

MANAGEMENT APPROACHES

There are three general approaches to forest management (Table 1.4):

1. **Timber management for financial efficiency --managing to provide timber products in the most financially efficient manner. This approach provides the second fewest negative tradeoffs, but the most values which are only moderately well provided (Figure 1.5).**
2. **Integrated management--managing forests to provide a variety of commodity and non-commodity values, including timber and wildlife habitat. This approach provides the most positive and fewest negative tradeoffs. Only the value "reserve areas" is not well or moderately well provided (Figure 1.6).**
3. **Management without commodity extraction--reserving forests so no commodity products are extracted from it. This approach provides the fewest positive tradeoffs and most negative tradeoffs. The only values which are better provided by this approach than by the "integrated" approach are "reserve areas" and "remote recreation" (Figure 1.7).**

Liquidation--rapid harvest of the forest for profit or to convert the land to other uses--is a fourth approach, but is not being extensively done in the United States at present and will not be considered in more detail.

Different approaches can readily be applied to private industrial and non-industrial forests, National Forests, other public forests, and productive reserves.

POLICY OPTIONS

Different management approaches could be used on different ownerships. Eight such mixtures of management approaches are analyzed[8] and described below and in Table 1.5A. Regional analyses are shown in Tables 1.5B through 1.5F. Other options can be suggested and analyzed.[9]

[8] The analysis multiplied the land area in each region which was managed by a management approach times the contribution of that approach to each value (Tables 1.3, 1.4, and Figures 1.2, 1.5, 1.6, and 1.7), and then summed the products for all land area for each region. The procedures are detailed in Section 1, Part 5 of main document.

[9] The analysis process is contained on personal computer spreadsheets; different options can be readily analyzed.

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Policy Option #1. **"Timber Management Option." This option allocates current legislatively withdrawn "reserves" to the "management without commodity extraction" approach. All other lands are managed by the "timber management for financial efficiency" approach.**

Policy Option #2. **"Expanded No-Commodity areas and Timber Management Option." This option allocates current legislatively withdrawn "reserves" and half of the National Forests to the "management without commodity extraction" approach. All other lands are managed by the "timber management for financial efficiency" approach.**

Policy Option #3. **"National Forest and Private, Non-industrial Forests Integrated Management Emphasis Option." This option allocates current legislatively withdrawn "reserves" to the "management without commodity extraction" approach. Other National Forest and all non-industrial private forest lands are managed by the "integrated management" approach, presumably by expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the "timber management for financial efficiency" approach.**

Policy Option #4. **"Expanded No-commodity, National Forest and Non-industrial Forests Integrated Management Emphasis Option." This option allocates current legislatively withdrawn "reserves" and half of the National Forests to the "management without commodity extraction" approach. The other half of the National Forests and all non-industrial private forest lands are managed by the "integrated management" approach, presumably by expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the "timber management for financial efficiency" approach.**

Policy Option #5. **"National Forest Reserves, and Private, Non-industrial Forests Integrated Management Emphasis Option." This option allocates current legislatively withdrawn "reserves" and all National Forests to the "management without commodity extraction" approach. Non-industrial private forest lands are managed by the "integrated management" approach, presumably by expanding various federal, state, and county incentives programs and by encouraging environmental organizations to provide such incentives (e.g., the Nature**

Conservancy and Ducks Unlimited). Other public forests and private industrial forests are managed by the "timber management for financial efficiency" approach.

<u>Policy Option #6.</u> "National Forest, Public, and Forest Industry Integrated Management Emphasis Option." This option allocates current legislatively withdrawn "reserves" to the "management without commodity extraction" approach. Other National Forest and all other publicly owned forest lands and industrial private forest lands are managed by the "integrated management" approach, building on the concept of large landowners developing "Habitat Conservation Plans" to protect species. This strategy relieves non-industrial private landowners of any incentives or obligations to manage other than by the "timber management for financial efficiency" approach.

<u>Policy Option #7.</u> "National Forest Reserves and Public, and Forest Industry Integrated Management Emphasis Option." This option allocates current legislatively withdrawn "reserves" and all National Forests to the "management without commodity extraction" approach. All other publicly owned forest lands and industrial private forest lands are managed by the "integrated management" approach, building on the concept of large landowners developing "Habitat Conservation Plans" to protect species. This option relieves non-industrial private landowners of any incentives or obligations to manage other "timber management for financial efficiency" approach.

<u>Policy Option #8.</u> "National Forest Reserves and Integrated Management Option." This option allocates current legislatively withdrawn "reserves" and all National Forest land to the "management without commodity extraction" approach. Other lands are left to be managed by the "integrated management" approach.

The management approaches applied to private, non-industrial forest lands will generally determine the values provided in the North and South, because most forests are under this ownership in these regions (Figure 1.1).

Applying a management approach to National Forests will strongly influence the values provided in the Inland West, Pacific Coast, and Alaska, because National Forests own a large proportion of the forests there.

Applying a management approach only to the private, industrial forest lands will not strongly influence the values provided in any region, because these landowners do not own large amounts of forest land in any region.

Policymakers may choose among these options to guide revisions of laws managing federal lands and incentives and other policies on other forests, depending on what

values they feel are important. The purpose of the displays is to give an understanding of the effects of the policy options on the various values. The policymakers will determine whether a value is important, and what weight it should have. They would then choose a policy option which gives the fewest negative tradeoffs to these values.

Presentation of all values makes the policymakers and the public aware of the effects of their decision on these values, even if they do not feel the values are important.[10] *Such an awareness helps avoid post-facto discounting of negative effects as "unforeseen consequences."*

[10] Morgan, M.G., and M. Henrion. 1990. *Uncertainty: a guide to dealing with uncertainty in quantitative risk and policy analysis.* Cambridge University Press. 332 pp.

SUMMARY

PART #5: GENERAL FIGURES AND TABLES.

FIGURE 1.1. THE UNITED STATES WILL BE DIVIDED INTO FIVE REGIONS FOR THIS REPORT. (Regions correspond to Powell et al. 1993).

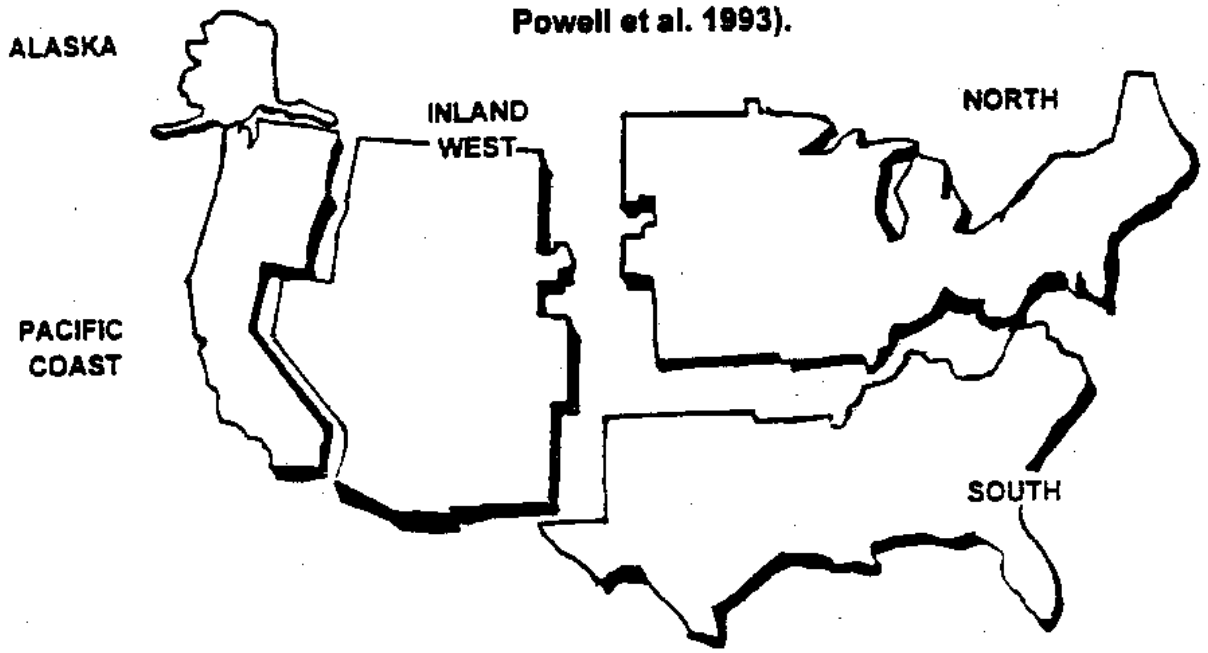
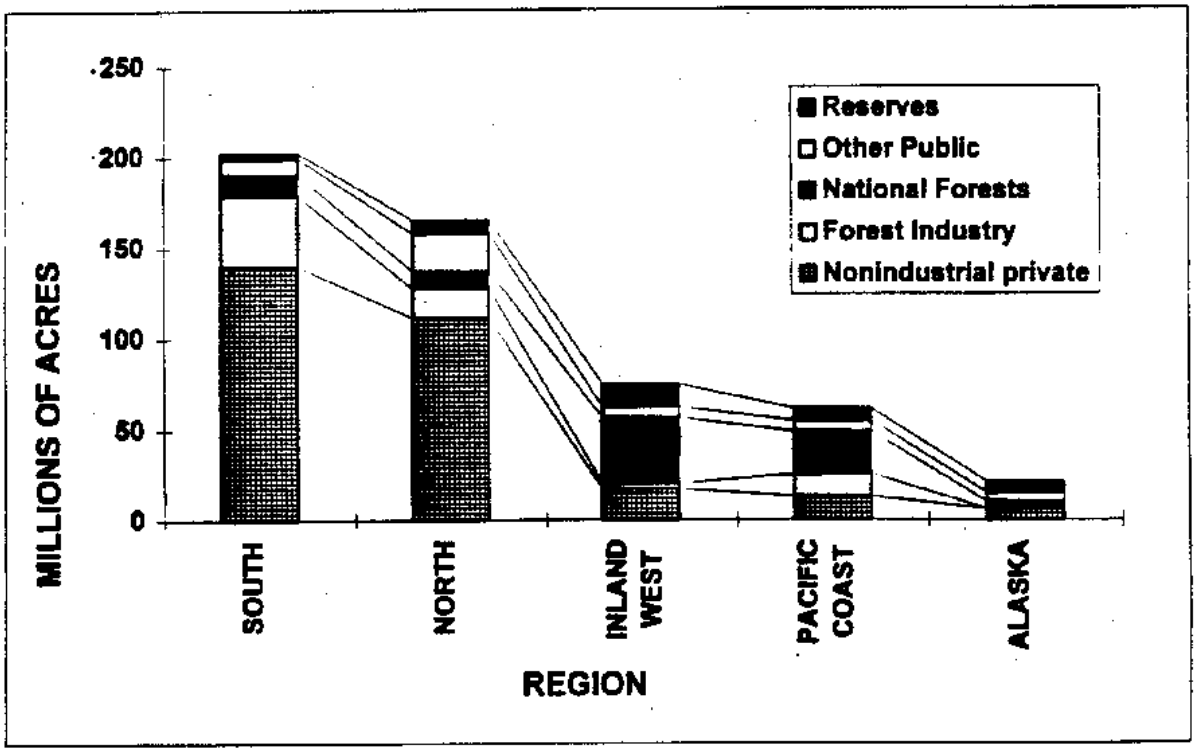


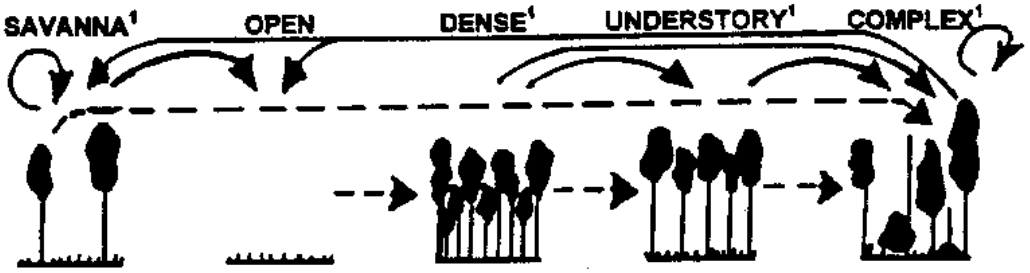
FIGURE 1.2. DISTRIBUTION OF PRODUCTIVE FOREST AREA BY REGION AND OWNERSHIP.



THE UNITED STATES' FORESTS ARE NOT EVENLY DISTRIBUTED AMONG REGIONS BY AREA OR OWNERSHIP.

FIGURE 1.3. STAND STRUCTURES AND UTILIZATION BY SPECIES

A. CHANGES IN STAND STRUCTURES FOLLOWING GROWTH (DASHED ARROWS) AND DISTURBANCES (SOLID ARROWS).



B. RELATIVE NUMBER OF SPECIES UTILIZING EACH STRUCTURE.

C. EXAMPLES OF THREATENED, ENDANGERED, OR EXTINCT SPECIES IN EACH REGION WHICH DEPEND ON SPECIFIC HABITATS[2]. (SEE TABLE 1.2).

THE SOUTH		
red-cockaded woodpecker		ivory billed woodpecker
THE NORTH		
karner blue butterfly	heath hen	Virginia northern flying squirrel
THE INLAND WEST		
	grizzly bear[3]	Mexican spotted owl
THE PACIFIC COAST		
Columbian white-tailed deer	lotus blue butterfly	northern spotted owl

1 By various usages, the savanna, dense, understory, and complex structures have each been referred to as "old growth."
2 The authors are grateful to Professor D.A.Maruwal, University of Washington and to Professor J.H.Shaw, Oklahoma State University for their advice. (Other sources were also consulted.)
3 The grizzly bear utilizes these openings for part of the year in the Inland West, but can adapt to some other structures.

FORESTS CONTAINED A VARIETY OF STAND STRUCTURES AS DISTURBANCES AND REGROWTH CHANGED EACH AREA. SOME SPECIES DEPEND ON EACH STRUCTURE (HABITAT), AND THERE ARE THREATENED AND/OR ENDANGERED SPECIES IN EACH REGION (EXCEPT ALASKA) WHERE THERE IS A SHORTAGE OF "SAVANNA" OR "OPEN" AS WELL AS "COMPLEX" HABITAT.

FIGURE 1.4.1A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--NATIONAL.
(from TABLE 1.1A)

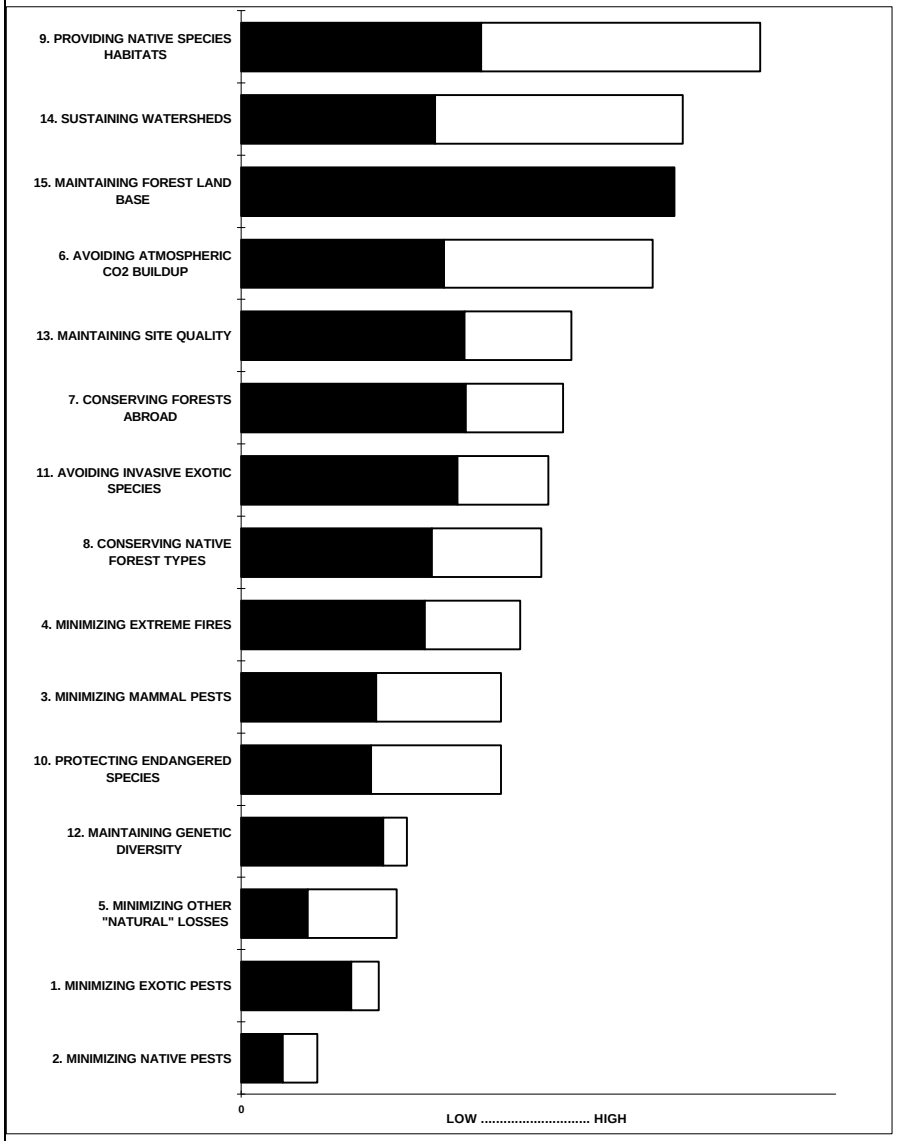
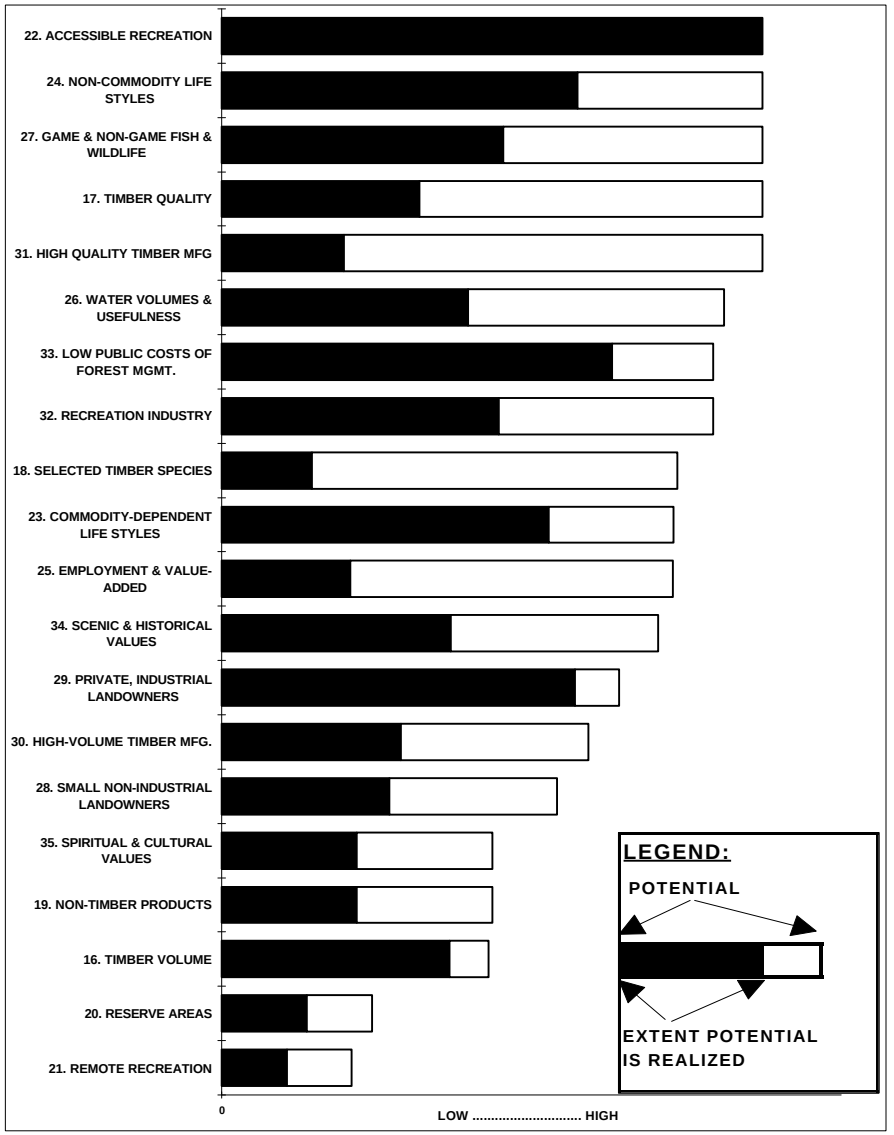


FIGURE 1.4.1B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--NATIONAL.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY POTENTIAL.

FIGURE 1.4.2A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--SOUTH.
(from TABLE 1.1A)

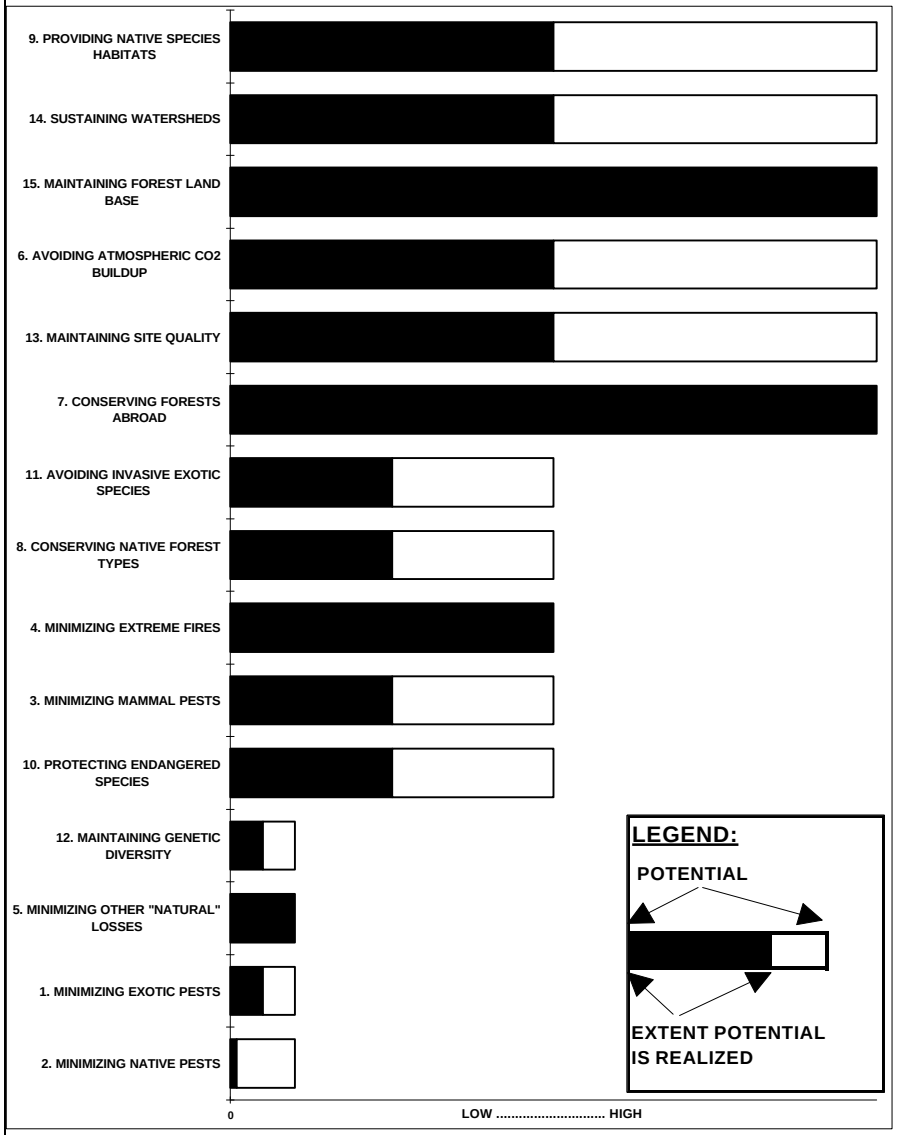
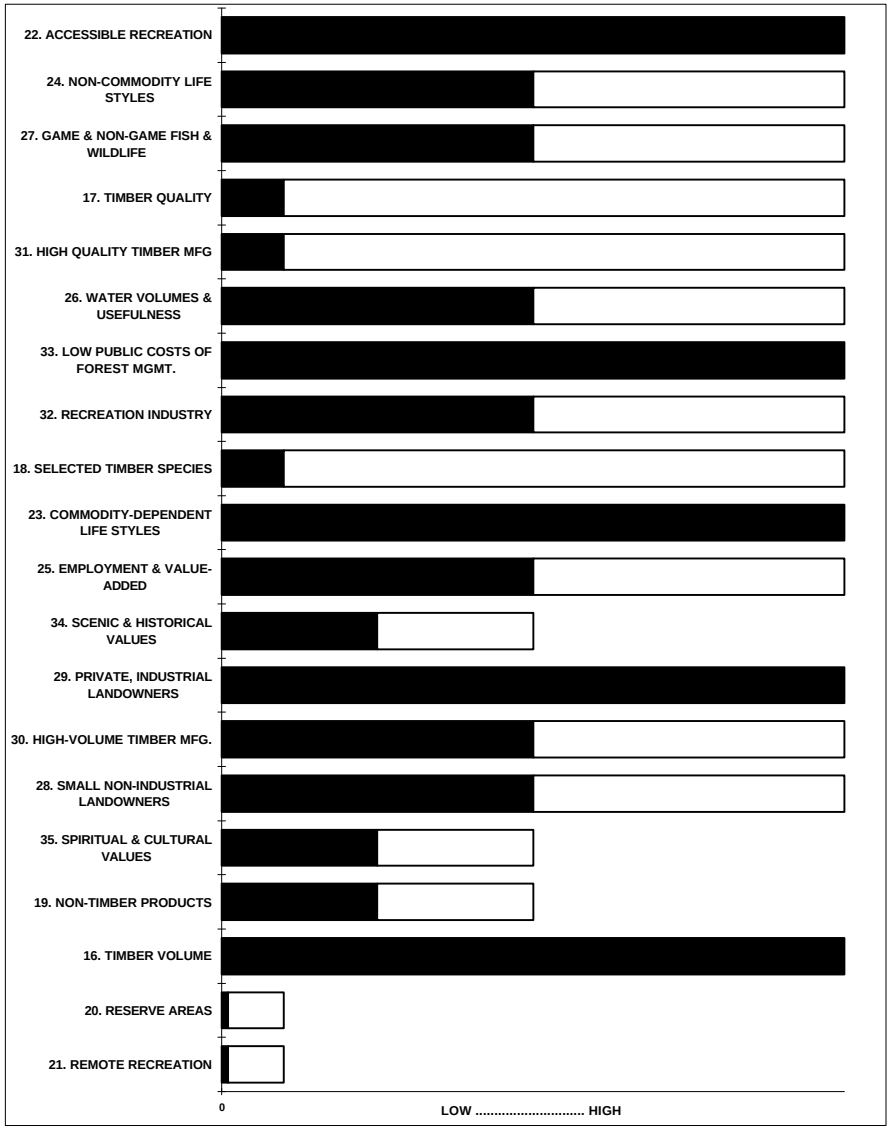


FIGURE 1.4.2B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--SOUTH.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY NATIONAL POTENTIAL (FIGURE 1.2.1A&B).

FIGURE 1.4.3A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--NORTH.
(from TABLE 1.1A)

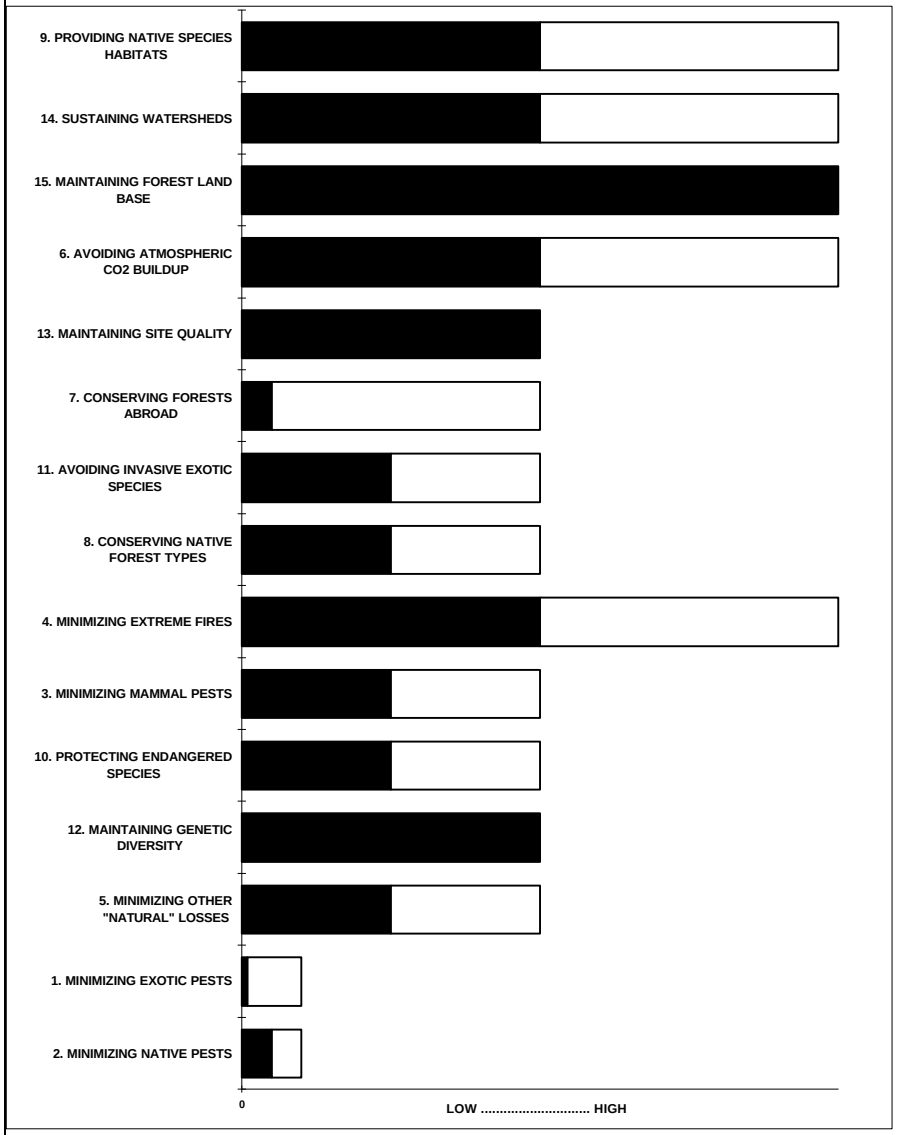
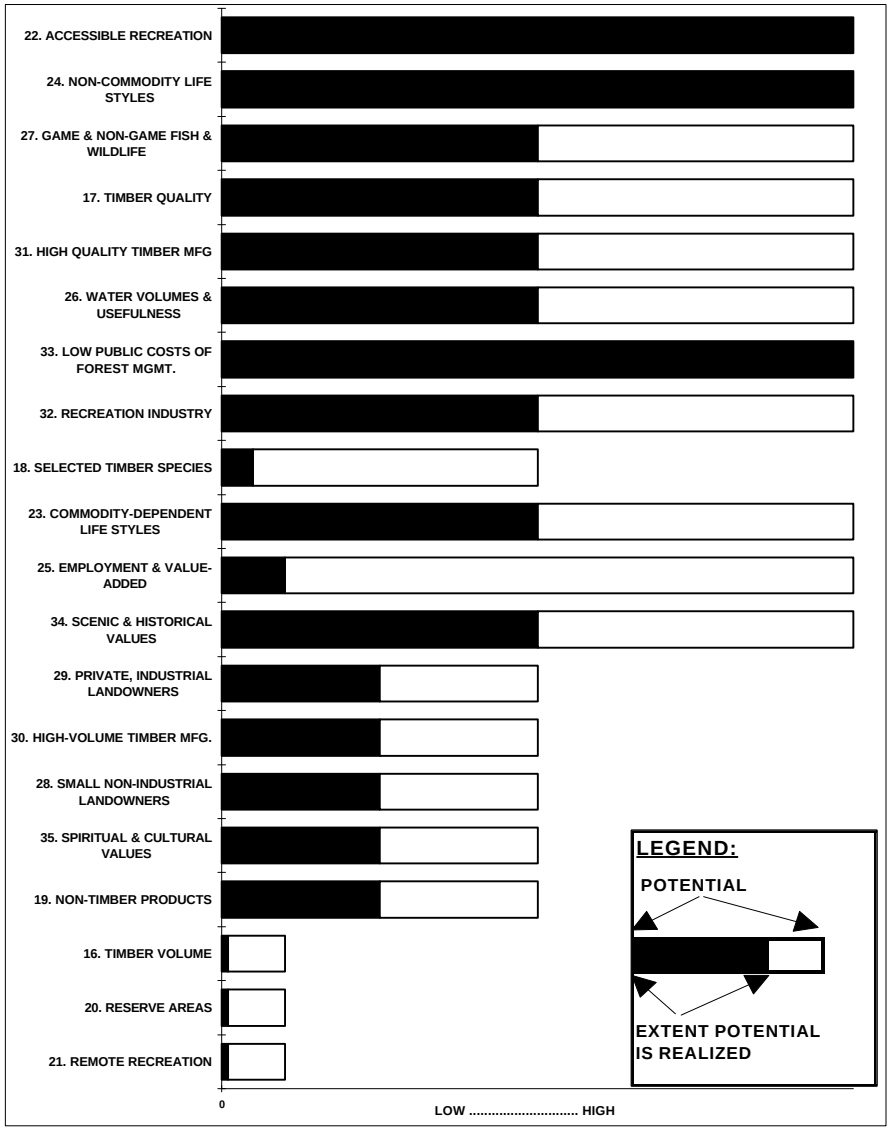


FIGURE 1.4.3B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--NORTH.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY NATIONAL POTENTIAL (FIGURE 1.2.1A&B).

FIGURE 1.4.4A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--INLAND WEST.
(from TABLE 1.1A)

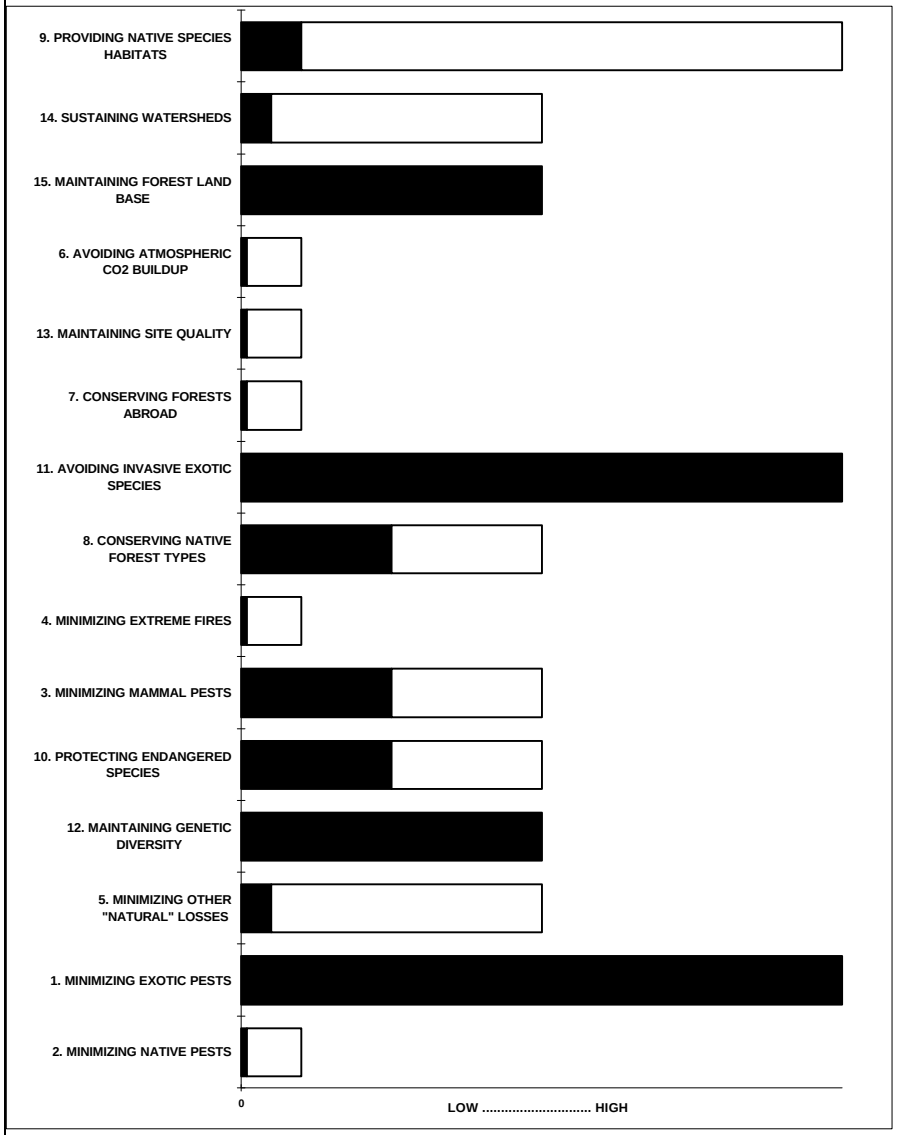
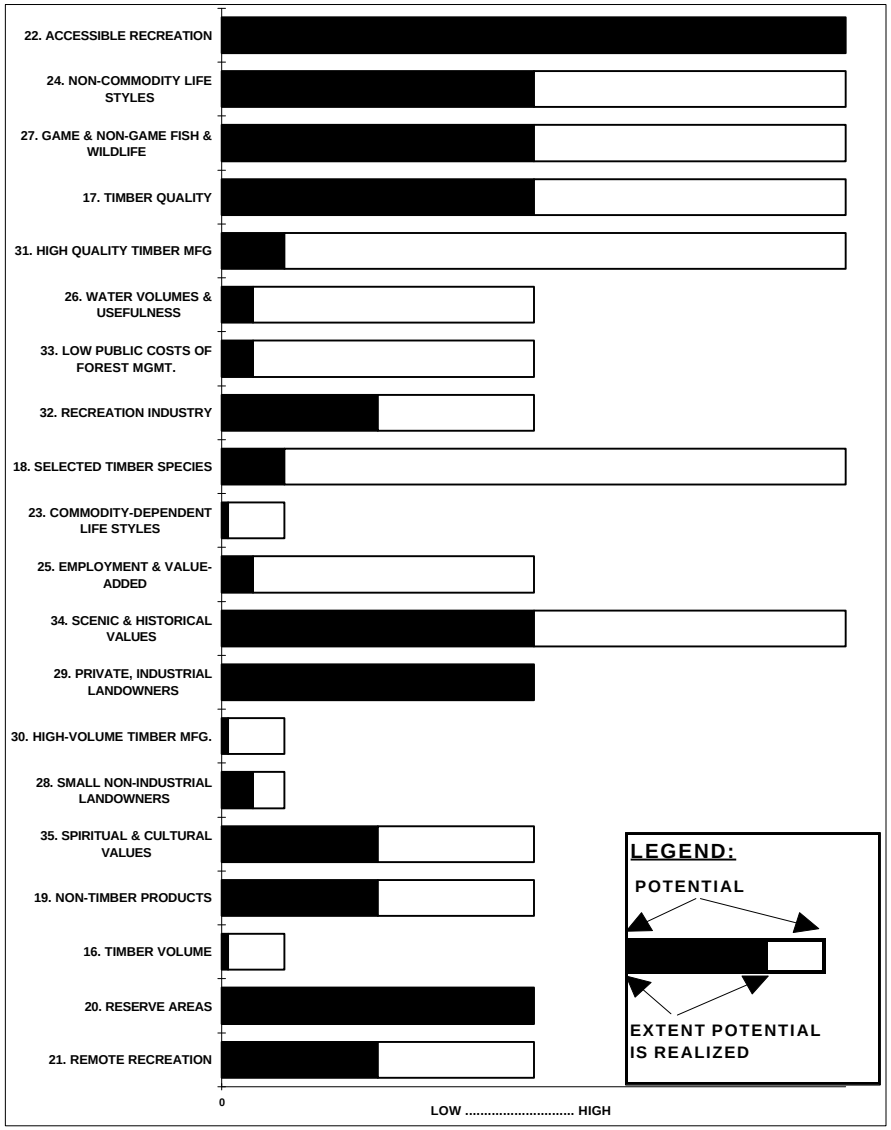


FIGURE 1.4.4B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--INLAND WEST.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY NATIONAL POTENTIAL (FIGURE 1.2.1A&B).

FIGURE 1.4.5A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--PACIFIC COAST.
(from TABLE 1.1A)

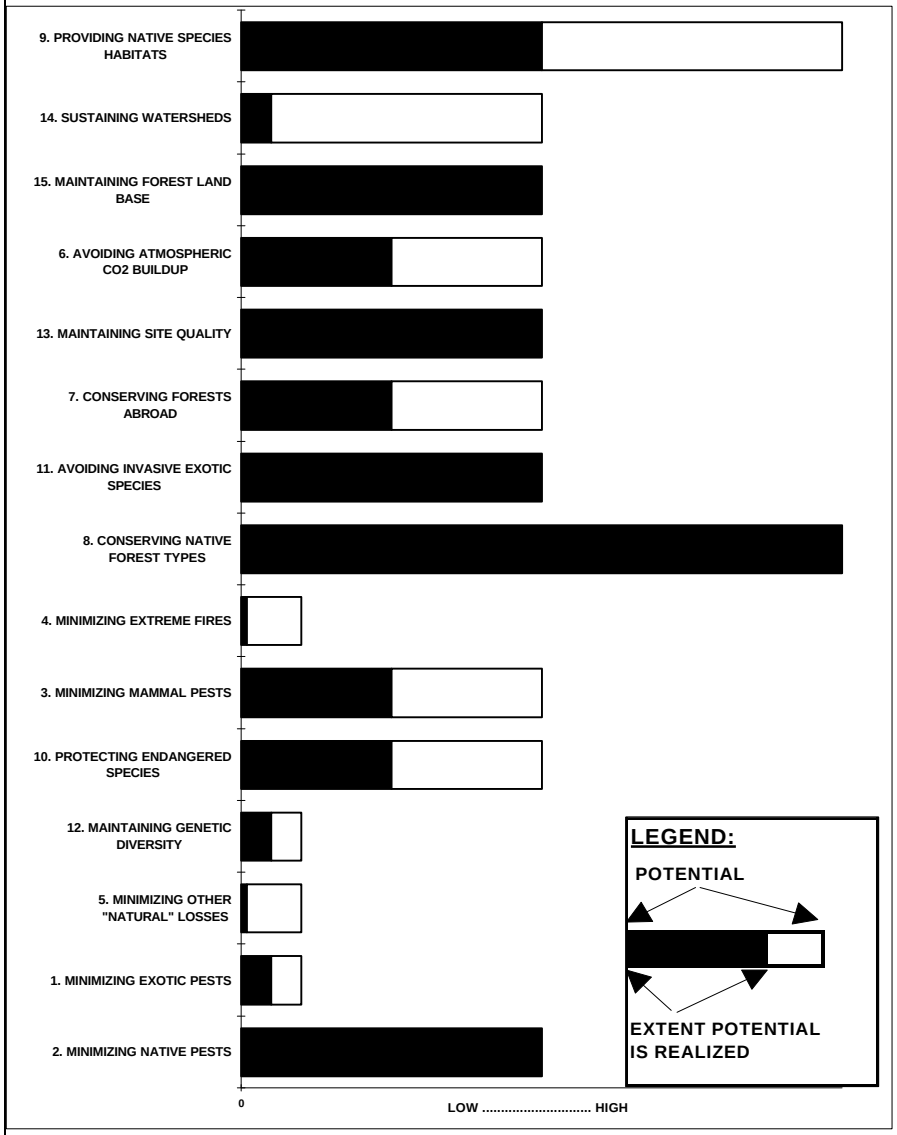
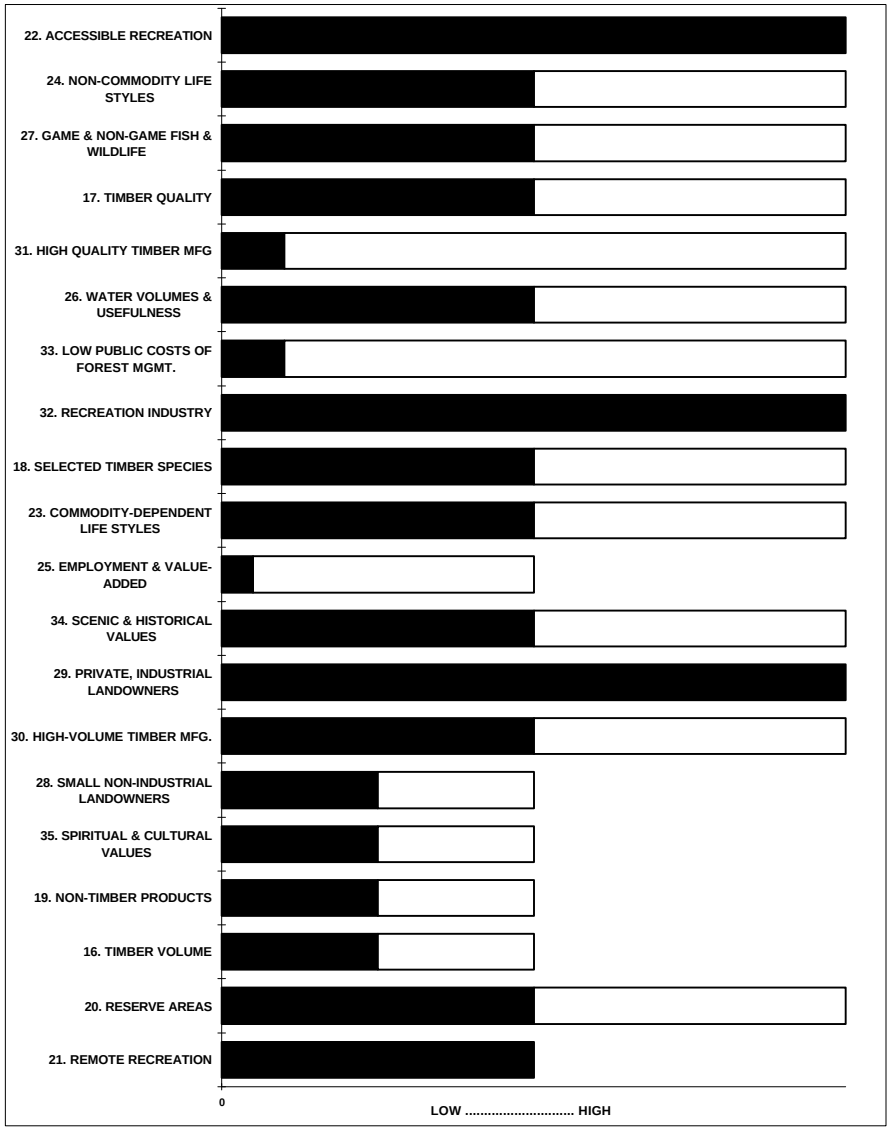


FIGURE 1.4.5B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--PACIFIC COAST.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY NATIONAL POTENTIAL (FIGURE 1.2.1A&B).

FIGURE 1.4.6A. POTENTIAL TO ACHIEVE AND EXTENT ACHIEVING FOREST CONDITIONS--ALASKA.
(from TABLE 1.1A)

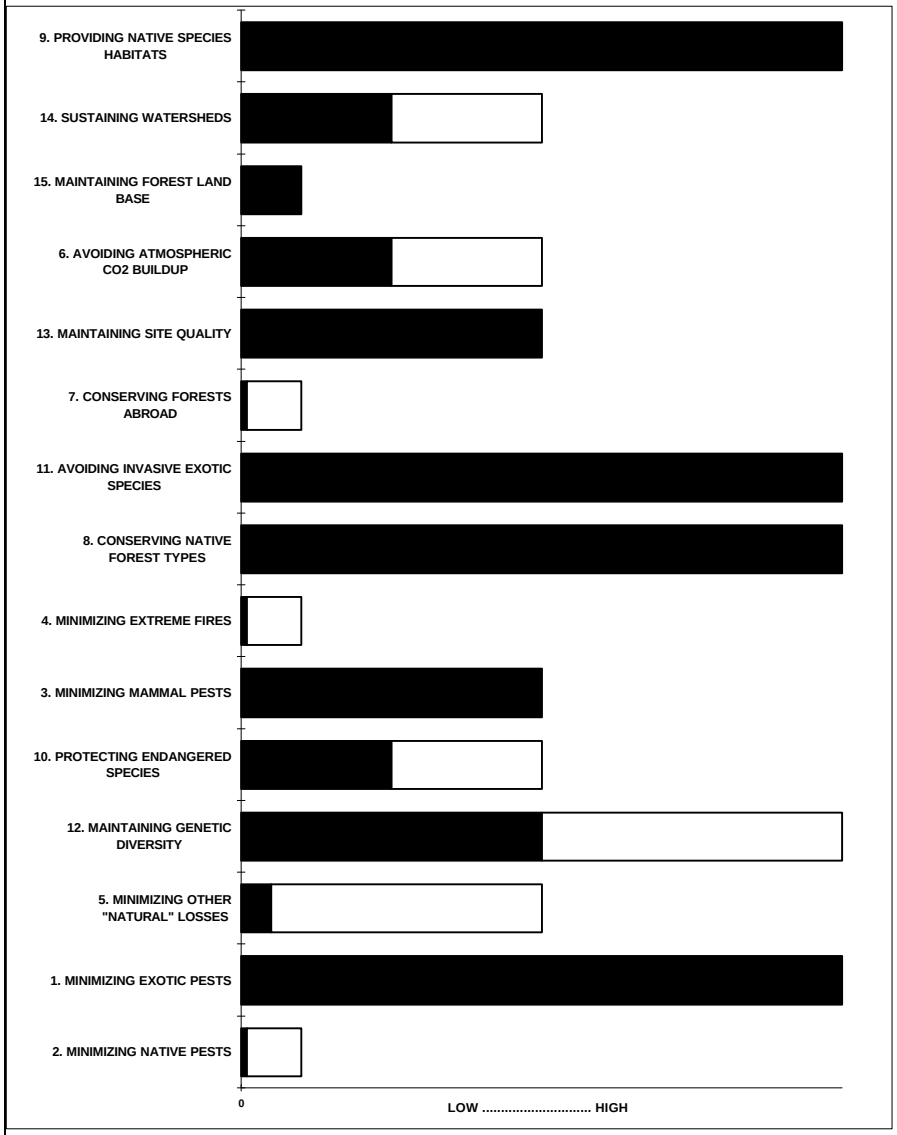
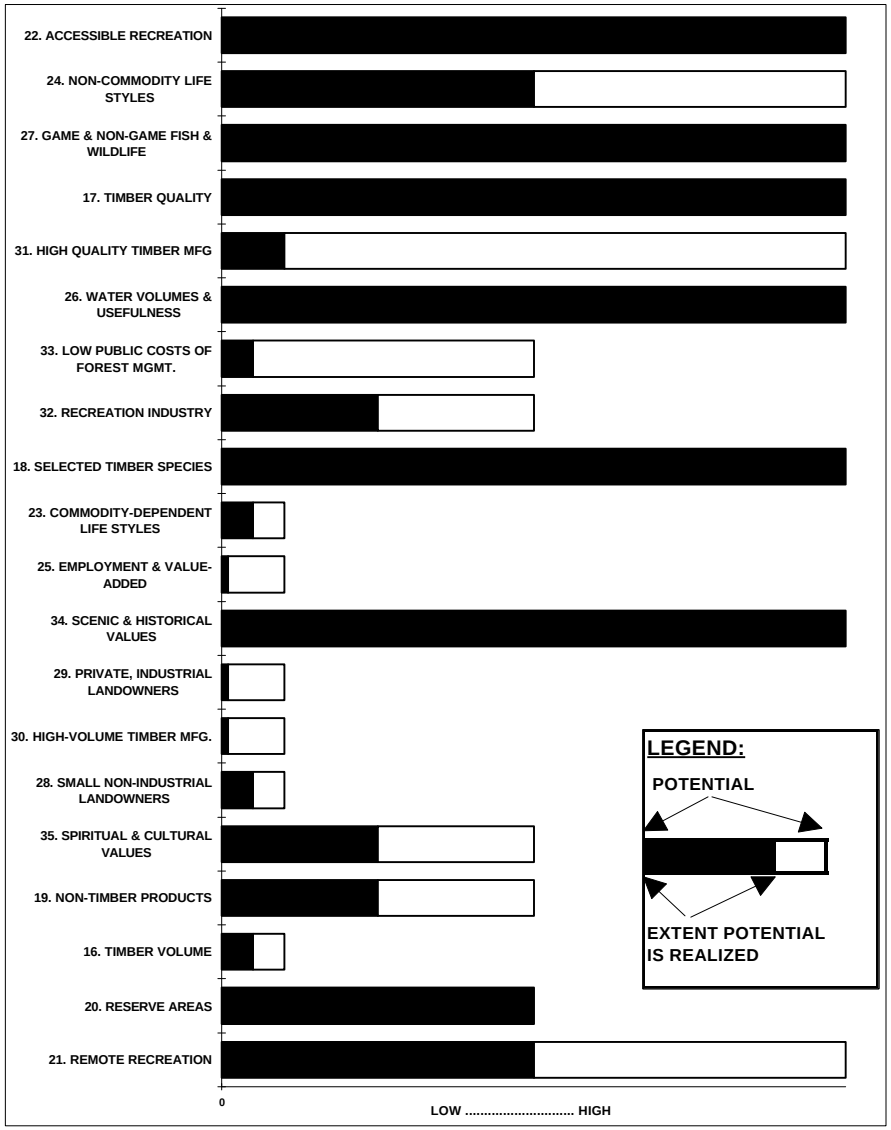


FIGURE 1.4.6B. POTENTIAL TO PROVIDE AND EXTENT PROVIDING CONTRIBUTIONS FROM FORESTS--ALASKA.
(from TABLE 1.1B)



UNREALIZED POTENTIAL IS SHOWN AS CLEAR PORTION OF BARS; RANKED BY NATIONAL POTENTIAL (FIGURE 1.2.1A&B).

FIGURE 1.5A. CONDITIONS ACHIEVED UNDER FINANCIAL EFFICIENCY MANAGEMENT (from TABLE 1.1A).

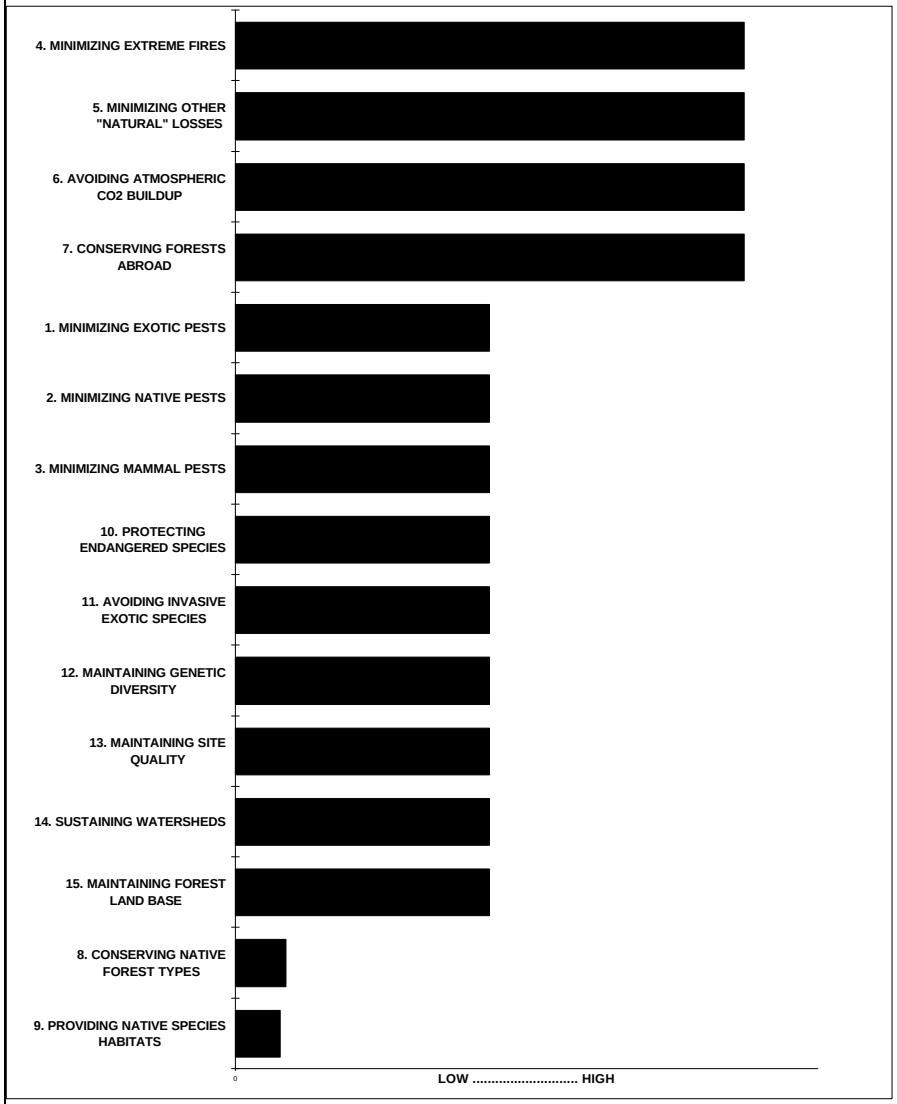
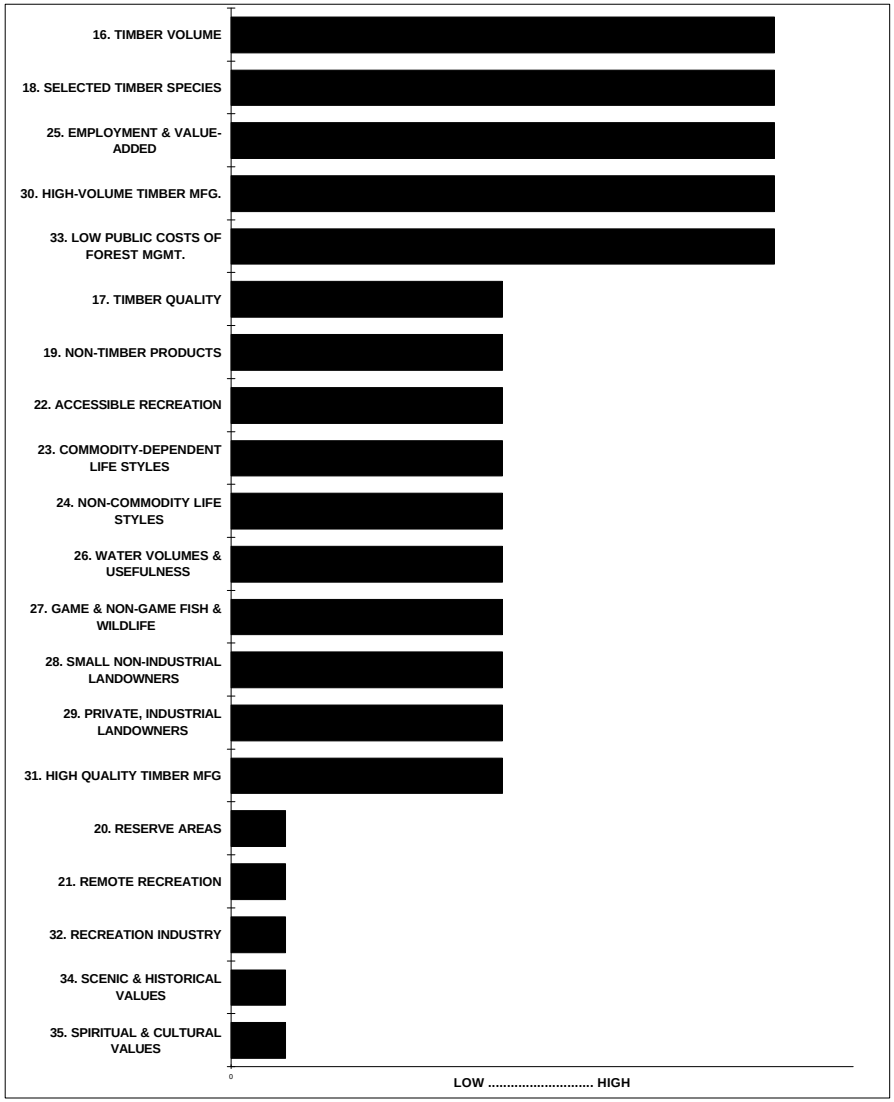


FIGURE 1.5B. CONTRIBUTIONS PROVIDED UNDER FINANCIAL EFFICIENCY MANAGEMENT (from TABLE 1.1B).



RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 1.6A. CONDITIONS ACHIEVED UNDER INTEGRATED MANAGEMENT (from TABLE 1.1A).

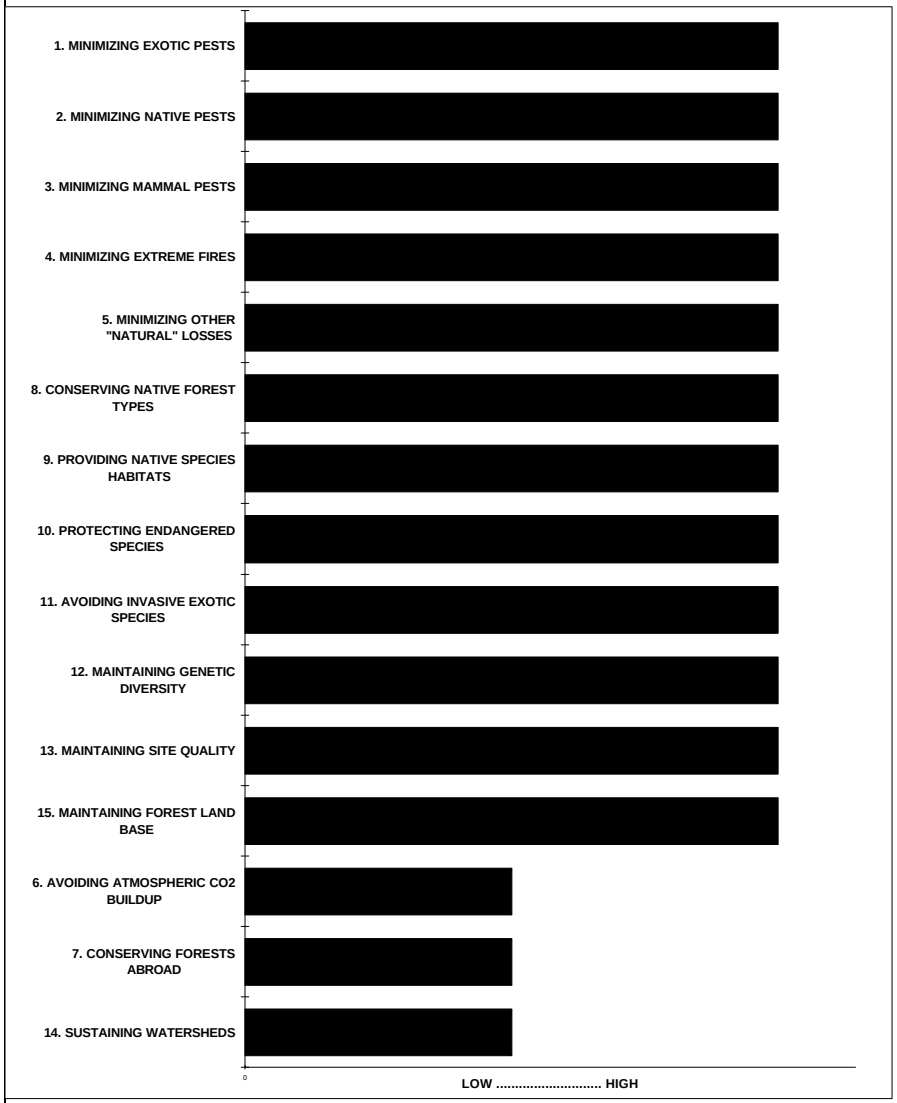
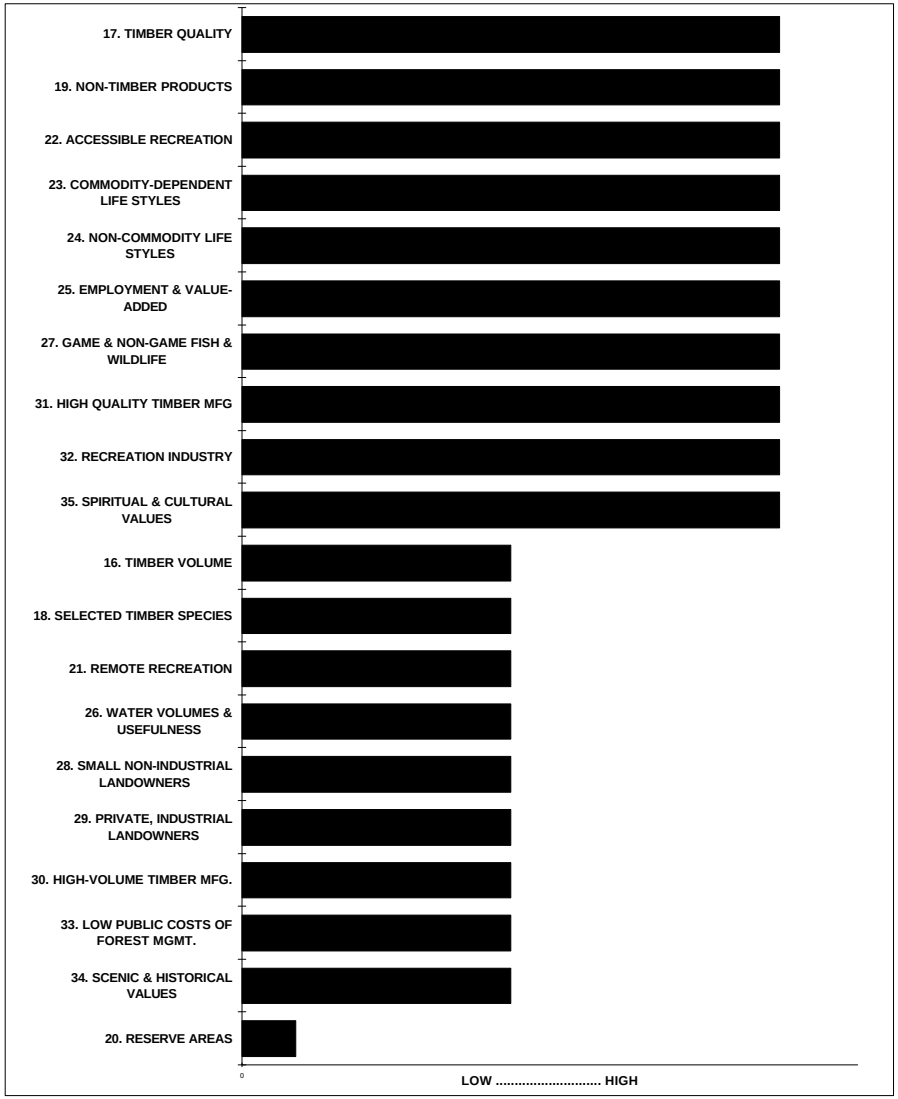


FIGURE 1.6B. CONTRIBUTIONS PROVIDED UNDER INTEGRATED MANAGEMENT (from TABLE 1.1B).



RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 1.7A. CONDITIONS ACHIEVED UNDER MANAGEMENT WITHOUT COMMODITY EXTRACTION (from TABLE 1.1A).

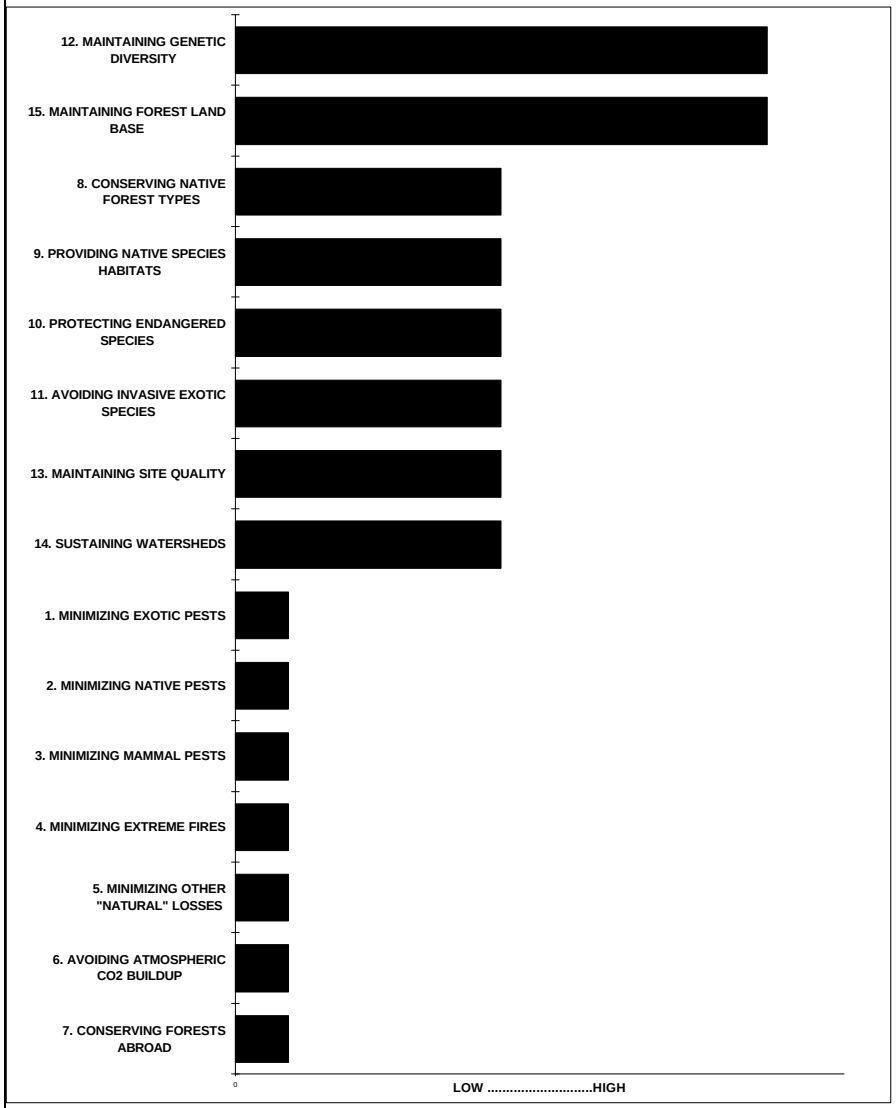
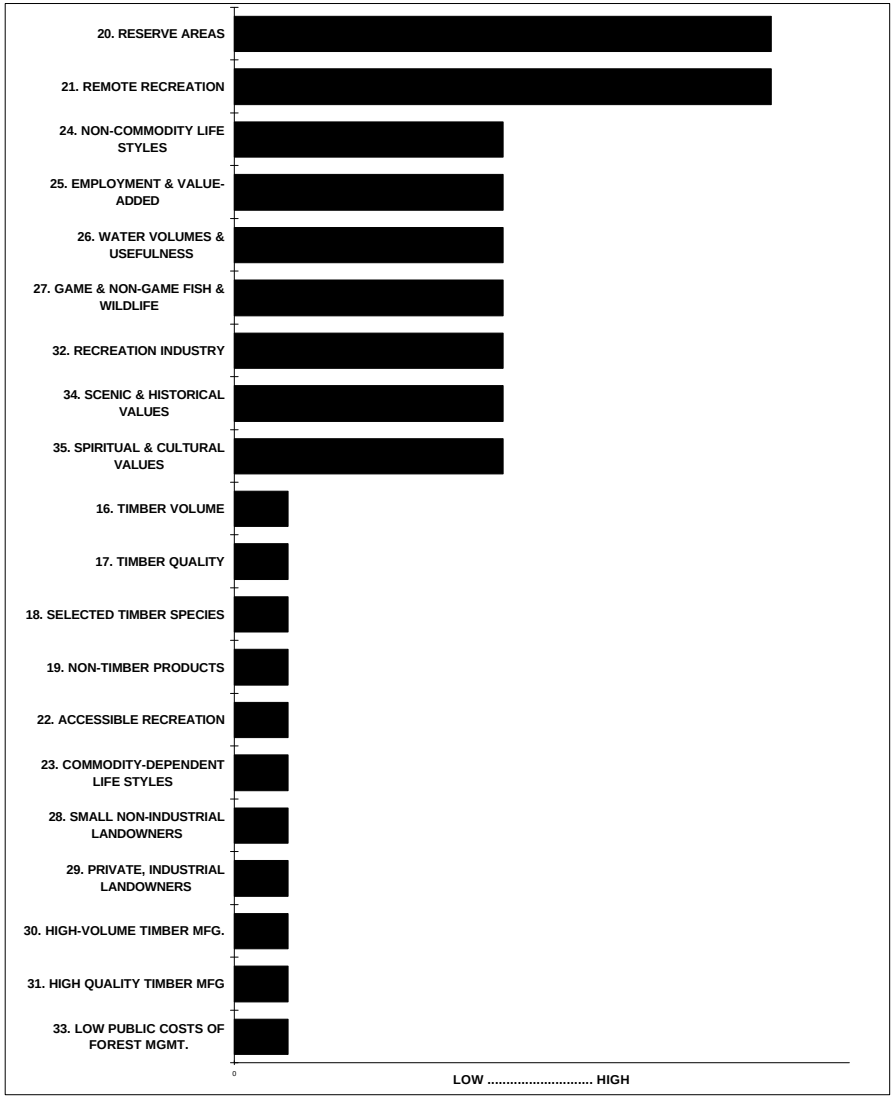
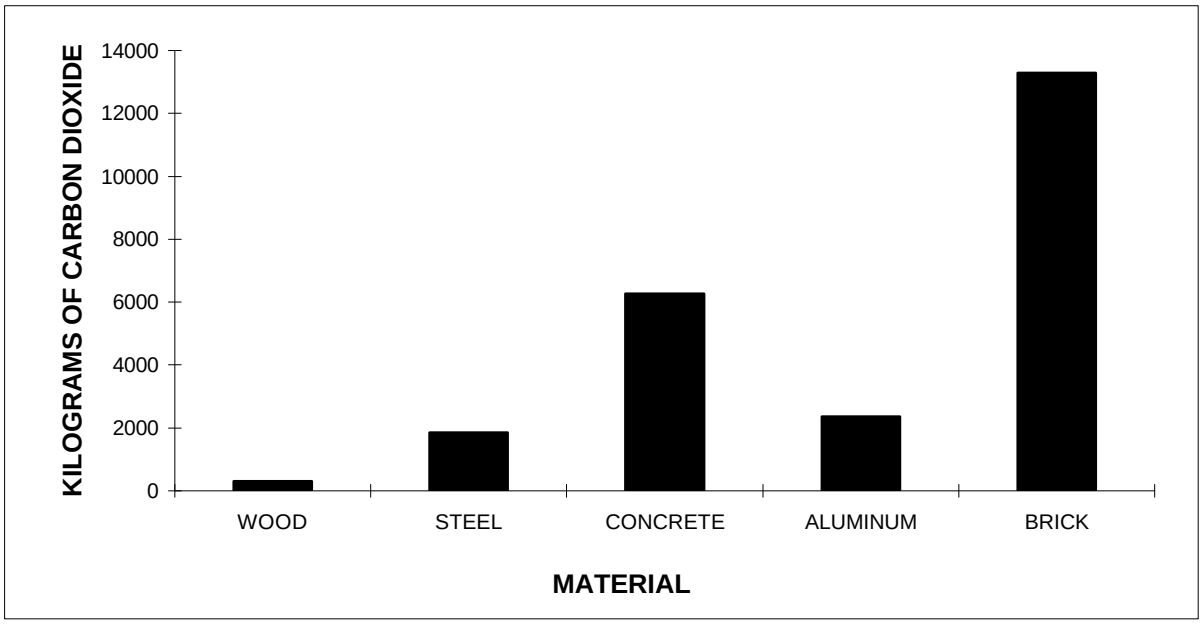


FIGURE 1.7B. CONTRIBUTIONS PROVIDED UNDER MANAGEMENT WITHOUT COMMODITY EXTRACTION (from TABLE 1.1B).



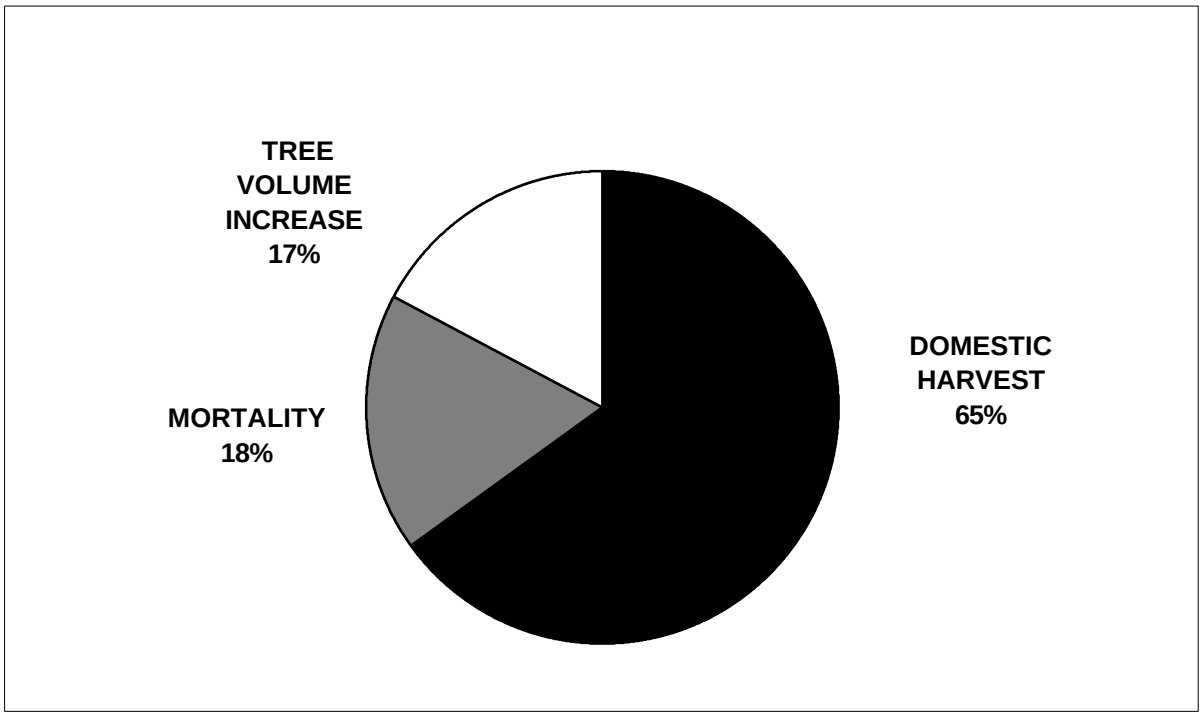
RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 1.8. CARBON DIOXIDE RELEASED TO PRODUCE WOOD PRODUCTS AND THEIR SUBSTITUTES.



(Values may change somewhat with product innovation and recalculation.)

FIGURE 1.9. WOOD GROWTH AND HARVEST.



THE UNITED STATES IS HARVESTING LESS THAN 65 PERCENT OF THE WOOD IT IS GROWING (Powell et al. 1993)

FIGURE 1.10. TREE VOLUME CHANGE BY REGIONS FROM 1952 TO 1992.

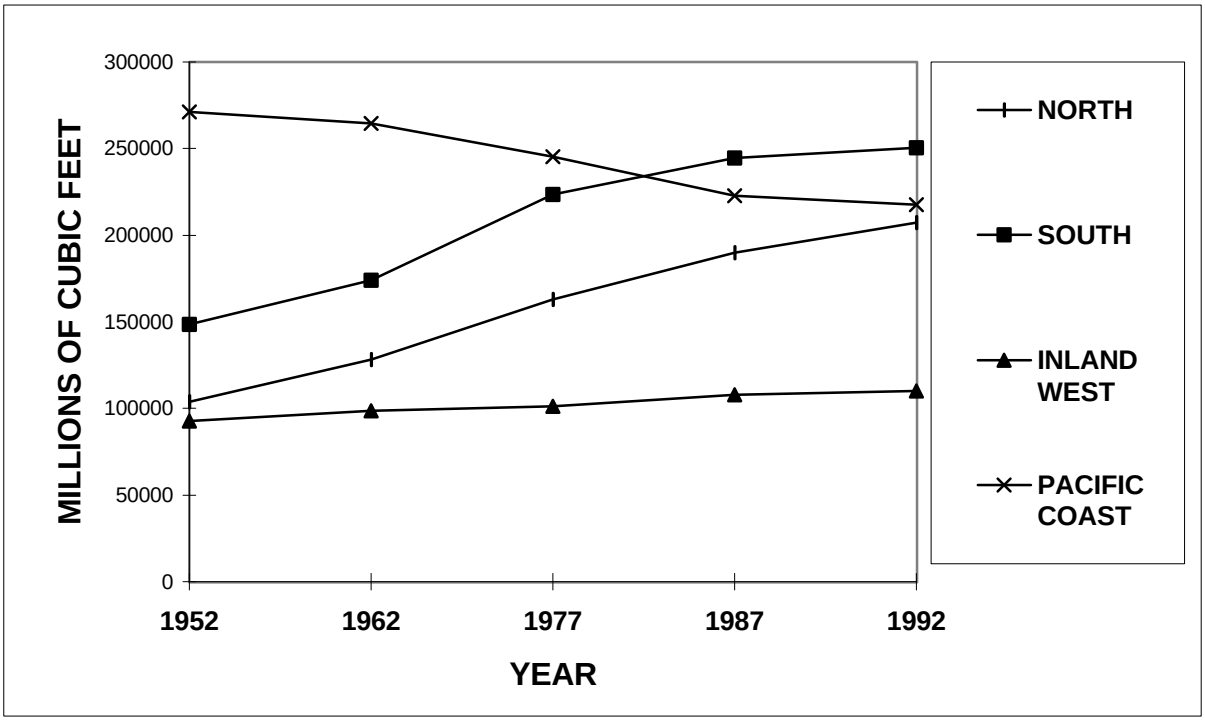


FIGURE 1.11. CHANGE IN URBAN AND RURAL POPULATION IN THE UNITED STATES FROM 1940 TO 1990.

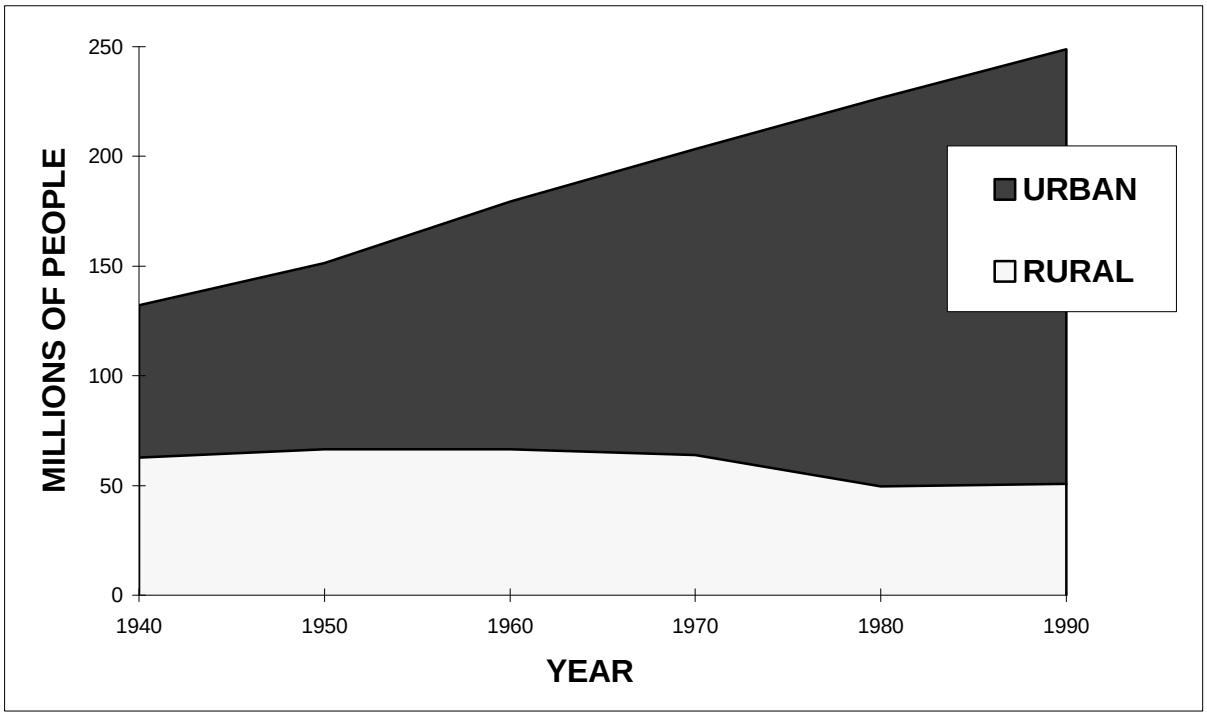


FIGURE 1.12. PROPORTION OF UNITED STATES' TOTAL POPULATION, PRODUCTIVE FOREST RESERVES, AND TOTAL SET-ASIDES IN EACH REGION.

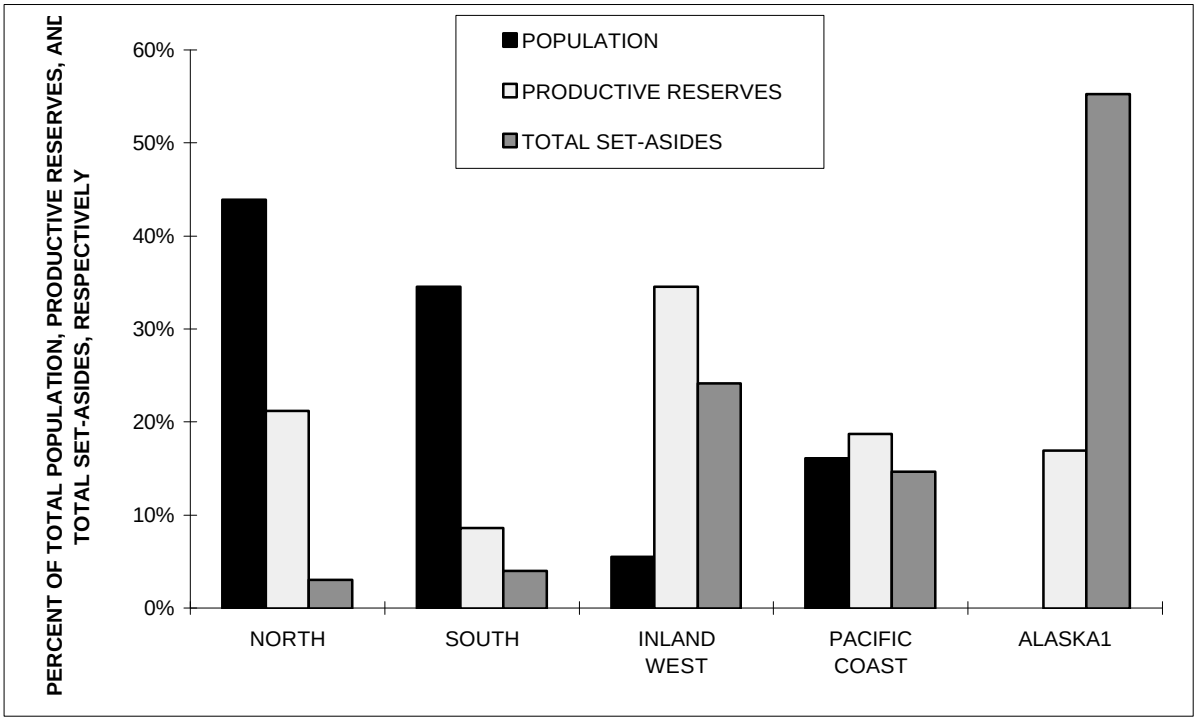


FIGURE 1.13. HARVEST, MORTALITY, AND VOLUME INCREASE IN EACH REGION.

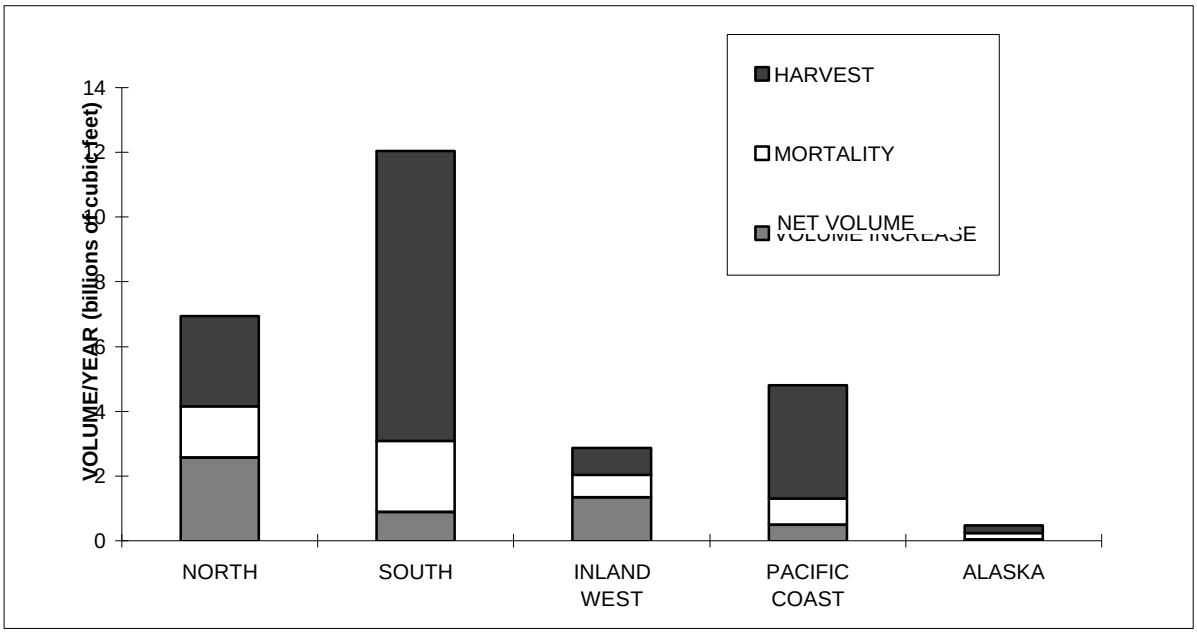


FIGURE 1.14. TREE SIZE DISTRIBUTION OF TREES IN EACH REGION.

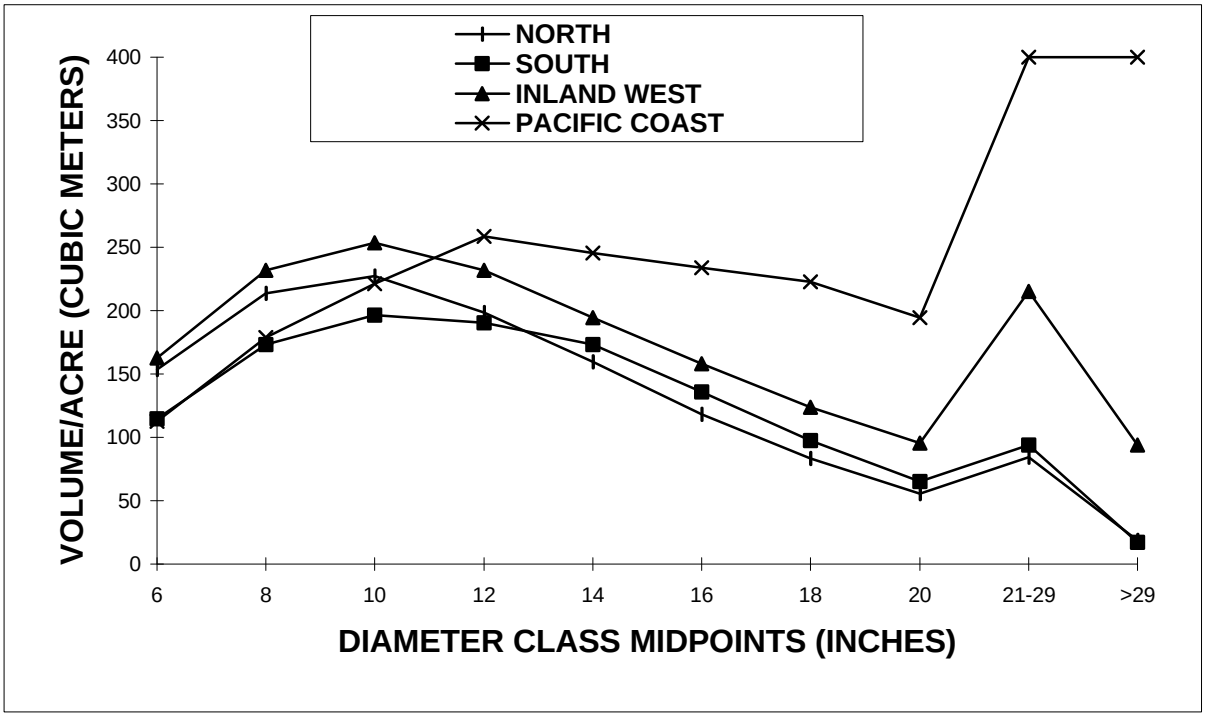


FIGURE 1.15. AREA BURNED ANNUALLY BY WILDFIRES IN THE WESTERN UNITED STATES, 1940-1944.

(Data courtesy of R.N.Sampson, American Forests)

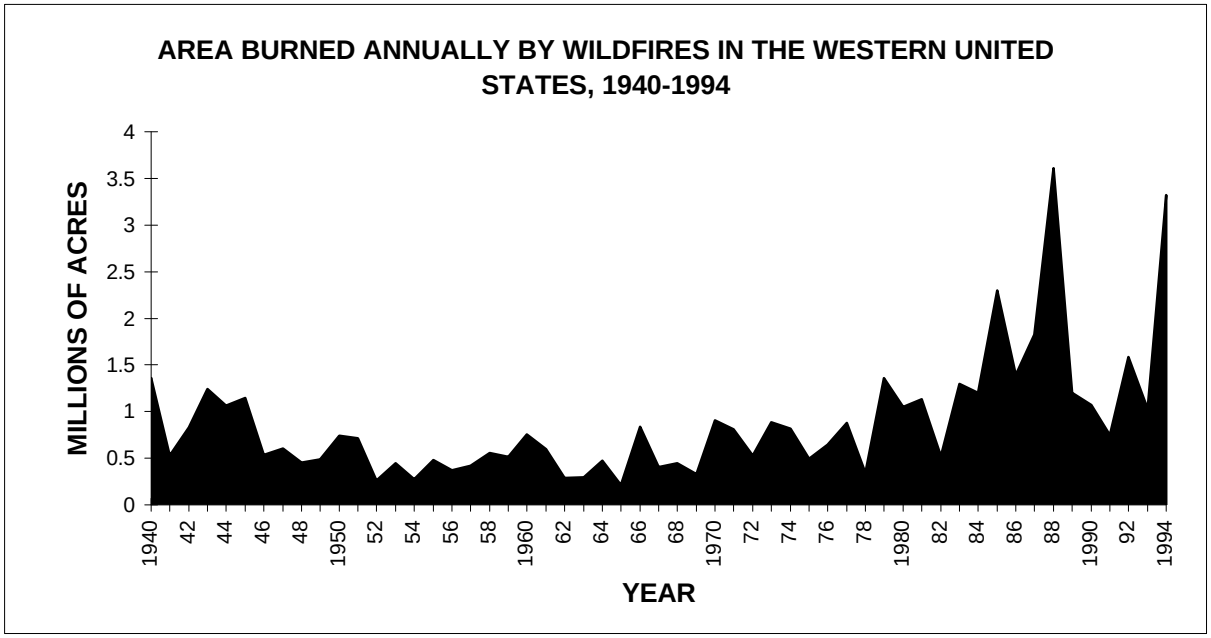


TABLE 1.1. FREQUENTLY EXPRESSED FOREST VALUES

(These values have been expressed in various formats. The relative importance of each value is determined by policymakers and landowners.)

TABLE 1.1A. VALUES EXPRESSED AS CONDITIONS AND FUNCTIONS OF THE FOREST.

SUSTAINING GROWTH OF FORESTS BY:

1. MINIMIZING LEVELS OF EXOTIC INSECT & DISEASE PESTS
2. MINIMIZING CATASTROPHIC LEVELS OF NATIVE MAMMALS
3. MINIMIZING CATASTROPHIC LEVELS OF NATIVE INSECT & DISEASE PESTS
4. MINIMIZING CATASTROPHIC FIRE EVENTS
5. MINIMIZING LOSSES FROM CATASTROPHIC WINDS & OTHER "NATURAL" EVENTS

SUSTAINING THE GLOBAL ENVIRONMENT BY:

6. AVOIDING ATMOSPHERIC CO2 & OTHER POLLUTANT BUILDUP
7. CONSERVING NATIVE FORESTS IN OTHER COUNTRIES

ENSURING PLANT AND ANIMAL DIVERSITY BY:

8. CONSERVING & RESTORING NATIVE FOREST TYPES & SPECIES
9. PROVIDING HABITATS FOR NATIVE SPECIES WITHIN FOREST TYPES
10. ENSURING SURVIVAL & RECOVERY OF THREATENED & ENDANGERED SPECIES
11. PROTECTING NATIVE SPECIES FROM INVASIVE EXOTIC SPECIES
12. MAINTAINING GENETIC DIVERSITY & ARCHITECTURE

ENSURING THE PRODUCTIVITY OF FUTURE FORESTS BY:

13. MAINTAINING SITE QUALITY
14. SUSTAINING WATERSHEDS
15. MAINTAINING FOREST LAND BASE

TABLE 1.1B. VALUES EXPRESSED AS CONTRIBUTIONS TO QUALITY OF LIFE

(but not listed in Table 1.1A).

TIMBER PRODUCTS

16. TIMBER VOLUME
17. TIMBER QUALITY
18. SELECTED SPECIES

19. NON-TIMBER, NON-WILDLIFE PRODUCTS
20. RESERVE AREAS

RECREATIONAL OPPORTUNITIES

21. REMOTE
22. ACCESSIBLE

RURAL LIFESTYLES

23. COMMODITY-DEPENDENT
24. NON-COMMODITY-DEPENDENT

25. EARNINGS, EMPLOYMENT, & VALUE-ADDED
26. WATER VOLUMES & USEFULNESS
27. GAME & NON-GAME FISH & WILDLIFE

VIABILITY OF VARIOUS FOREST ECONOMIC SEGMENTS

28. SMALL, PRIVATE, NON-INDUSTRIAL LANDOWNERS
29. PRIVATE, INDUSTRIAL LANDOWNERS
30. HIGH-VOLUME TIMBER PRODUCTS MANUFACTURERS
31. PRODUCTS MANUFACTURERS UTILIZING HIGH QUALITY TIMBER
32. RECREATION INDUSTRY

33. LOW PUBLIC COSTS OF MANAGING FOREST LANDS
34. SCENIC, EXISTENCE, & HISTORICAL VALUES
35. SPIRITUAL & CULTURAL VALUES

TABLE 1.2. EXAMPLES OF THREATENED & ENDANGERED FOREST SPECIES BY REGION.

North:

- **Karner blue butterfly (*Lycaeides melissa samuelis*)**
- **Eastern cougar (*Felis concolor cougar*)**
- **Virginia northern flying squirrel (*Glaucomys asbrinus fuscus*)**
- **Extinct**
  - **Wood bison (*Bison bison athabascae*) populations found in Canada**
  - **Heath hen *(Tympanuchus cupido cupido)***

South

- **Eastern cougar (*Felis concolor cougar*)**
- **Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*)**
- **Red-cockaded woodpecker (*Picoides borealis*)**
- **Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*)**
- **Red wolf (*Canis rufus*)**
- **Florida panther (*Felis concolor coryi*)**
- **American black bear (*Ursus americanus*)**
- **Louisiana black bear (*Ursus americanus luteolus*)**
- **Extinct:**
  - **Ivory billed woodpecker (*Campephilus principalis*)**

Inland West

- **Woodland caribou (*Rangifer tarandus caribou*)**
- **Brown bear or grizzly bear (*Ursus arctos horribilis*)**
- **Mexican spotted owl (*Strix occidentalis lucida*)**

Pacific Coast

- **Oregon silverspot butterfly (*Speyeria zerene hippolyta*)**
- **Columbian white-tailed deer (*Odocoileus virginianus leucurus*)**
- **Northern spotted owl (*Strix occidentalis caurina*)**
- **Woodland caribou (*Rangifer tarandus caribou*)**
- **Brown bear or grizzly bear (*Ursus arctos horribilis*)**
- **Lotis blue butterfly (*Lycaeides argyrognomon lotis*)**
- **Marbled murrelet (*Brachyramphus marmoratus marmoratus*)**

REF: Lowe, D.W., J.R.Matthews, and C.J.Moseley (editors). 1990. The official World Wildlife Fund guide to endangered species of North America. Beacham Publishing, Inc. Washington, D.C. Four volumes.

THESE SPECIES ARE PRIMARILY ASSOCIATED WITH SAVANNA, OPEN, AND COMPLEX FOREST STRUCTURES. (See Figure 1.3.)

TABLE1.3. EFFECTS OF DIFFERENT MANAGEMENT APPROACHES ON VALUES FOR ALL UNITED STATES(Numbered values (from Table 1) show relative value from 1 (lowest) to 10 (highest).

	PRESENT	TIMBER MANAGEMENT	INTEGRATED	NO COMMODITY
		AREA IN EACH APPROACH		
TIMBER MANAGEMENT AREA (millions of acres)	404	525	0	0
INTEGRATED AREA (millions of acres)	85	0	525	0
NON-COMMODITY AREA (millions of acres)	36	0	0	525
		SELECTED ECONOMIC MEASURES		
TIMBER HARVEST VOLUME (billion FT3/year)	16.3	21.6	19.2	0.0
EMPLOYMENT (thousands of people)				
FORESTRY & LOGGING	129	154	269	3
LUMBER & WOOD PRODUCTS	752	949	1,258	0
PAPER & ALLIED PRODUCTS	691	906	806	0
CARPENTERS	1,255	1,661	1,477	0
INDIRECT	2,827	3,671	3,809	3
TOTAL	5,654	7,342	7,619	6
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	5.3	2.9	-16.3
PUBLIC COST OF MANAGEMENT (billions of dollars)	4	3	6	87
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	20	55	56	0
	ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1= lowest; 10= highest)			
1. MINIMIZING EXOTIC PESTS	5	5	10	1
2. MINIMIZING NATIVE PESTS	4	5	10	1
3. MINIMIZING MAMMAL PESTS	5	5	10	1
4. MINIMIZING EXTREME FIRES	5	10	10	1
5. MINIMIZING OTHER "NATURAL" LOSSES	5	10	10	1
6. AVOIDING ATMOSPHERIC CO2 BUILDUP	5	10	5	1
7. CONSERVING FORESTS ABROAD	4	10	5	1
8. CONSERVING NATIVE FOREST TYPES	5	1	10	5
9. PROVIDING NATIVE SPECIES HABITATS	4	1	10	5
10. PROTECTING ENDANGERED SPECIES	5	5	10	5
11. AVOIDING INVASIVE EXOTIC SPECIES	6	5	10	5
12. MAINTAINING GENETIC DIVERSITY	6	5	10	10
13. MAINTAINING SITE QUALITY	6	5	10	5
14. SUSTAINING WATERSHEDS	4	5	5	5
15. MAINTAINING FOREST LAND BASE	7	5	10	10
16. TIMBER VOLUME	4	10	5	1
17. TIMBER QUALITY	4	5	10	1
18. SELECTED TIMBER SPECIES	3	10	5	1
19. NON-TIMBER PRODUCTS	5	5	10	1
20. RESERVE AREAS	3	1	1	10
21. REMOTE RECREATION	3	1	5	10
22. ACCESSIBLE RECREATION	7	5	10	1
23. COMMODITY-DEPENDENT LIFE STYLES	5	5	10	1
24. NON-COMMODITY LIFE STYLES	6	5	10	5
25. EMPLOYMENT & VALUE-ADDED	3	10	10	5
26. WATER VOLUMES & USEFULNESS	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE	5	5	10	5
28. SMALL NON-INDUSTRIAL LANDOWNERS	5	5	5	1
29. PRIVATE, INDUSTRIAL LANDOWNERS	6	5	5	1
30. HIGH-VOLUME TIMBER MFG.	4	10	5	1
31. HIGH QUALITY TIMBER MFG	3	5	10	1
32. RECREATION INDUSTRY	5	1	10	5
33. LOW PUBLIC COSTS OF FOREST MGMT.	6	10	5	1
34. SCENIC & HISTORICAL VALUES	5	1	5	5
35. SPIRITUAL & CULTURAL VALUES	5	1	10	5

TABLE 1.4. SUMMARY OF POLICY OPTIONS BY MANAGEMENT APPROACH AND OWNERSHIP CLASS.

	POLICY OPTIONS							
	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
TIMBER MANAGEMENT FOR FINANCIAL EFFICIENCY	NF OP FI NIPF	50% NF OP FI NIPF	OP FI	OP FI	OP FI	NIPF	NIPF	
INTEGRATED MANAGEMENT			NF NIPF	50% NF NIPF	NIPF	NF OP FI	OP FI	OP FI NIPF
MANAGEMENT WITHOUT COMMODITY EXTRACTION	PR	PR 50% NF	PR	PR 50% NF	PR NF	PR	PR NF	PR NF

PR = PRESENT, PRODUCTIVE RESERVES

NF = NATIONAL FORESTS

OP = OTHER PUBLIC FORESTS

FI = PRIVATE, INDUSTRIAL FORESTS

NIPF = NON-INDUSTRIAL, PRIVATE FORESTS

TABLE 1.5A. SUMMARY OF EFFECTS OF POLICY OPTIONS FOR ALL UNITED STATES.
(Values are relative and not directly comparable to present condition.)

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	404	490	447	117	117	117	288	288	0
INTEGRATED AREA (millions of acres)	85	0	0	372	330	288	202	117	405
NON-COMMODITY AREA (millions of acres)	36	36	78	36	78	120	36	120	120
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	16.3	20.3	18.5	18.3	16.7	15.1	19.2	15.9	14.4
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	129	143	131	222	200	179	188	145	205
LUMBER & WOOD PRODUCTS	752	895	813	1,097	990	884	1,010	798	951
PAPER & ALLIED PRODUCTS	691	854	776	768	701	633	805	670	605
CARPENTERS	1,255	1,565	1,423	1,408	1,284	1,161	1,476	1,228	1,109
INDIRECT	2,827	3,457	3,143	3,495	3,176	2,857	3,479	2,841	2,869
TOTAL	5,654	6,914	6,285	6,990	6,352	5,714	6,957	5,681	5,738
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	4.0	2.2	2.0	0.4	-1.2	2.9	-0.4	-1.9
PUBLIC COST OF MANAGEMENT (billions of dollars)	3.6	3.2	3.0	5.0	4.6	4.2	4.2	3.3	4.8
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	19.8	46.1	32.5	44.2	31.2	18.2	44.1	18.1	17.4
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS	5	5	4	8	7	6	7	5	4
2. MINIMIZING NATIVE PESTS	4	5	4	8	7	6	7	5	4
3. MINIMIZING MAMMAL PESTS	5	5	4	8	7	6	7	5	4
4. MINIMIZING EXTREME FIRES	5	9	8	9	8	7	9	7	7
5. MINIMIZING OTHER "NATURAL" LOSSES	5	9	8	9	8	7	9	7	7
6. AVOIDING ATMOSPHERIC CO2 BUILDUP	5	9	8	6	5	5	7	6	7
7. CONSERVING FORESTS ABROAD	4	9	8	6	5	5	7	6	7
8. CONSERVING NATIVE FOREST TYPES	5	1	2	7	7	6	6	4	2
9. PROVIDING NATIVE SPECIES HABITATS	4	1	2	7	7	6	6	4	2
10. PROTECTING ENDANGERED SPECIES	5	5	5	8	8	7	7	6	5
11. AVOIDING INVASIVE EXOTIC SPECIES	6	5	5	8	8	7	7	6	5
12. MAINTAINING GENETIC DIVERSITY	6	6	6	9	9	9	8	8	7
13. MAINTAINING SITE QUALITY	6	5	5	8	8	7	7	6	5
14. SUSTAINING WATERSHEDS	4	5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE	7	6	6	9	9	9	8	8	7
16. TIMBER VOLUME	4	9	8	6	5	5	7	6	7
17. TIMBER QUALITY	4	5	4	8	7	6	7	5	4
18. SELECTED TIMBER SPECIES	3	9	8	6	5	5	7	6	7
19. NON-TIMBER PRODUCTS	5	5	4	8	7	6	7	5	4
20. RESERVE AREAS	3	2	3	2	3	4	2	4	4
21. REMOTE RECREATION	3	2	3	5	5	6	4	5	4
22. ACCESSIBLE RECREATION	7	5	4	8	7	6	7	5	4
23. COMMODITY-DEPENDENT LIFE STYLES	5	5	4	8	7	6	7	5	4
24. NON-COMMODITY LIFE STYLES	6	5	5	8	8	7	7	6	5
25. EMPLOYMENT & VALUE-ADDED	3	9	9	9	9	8	9	8	8
26. WATER VOLUMES & USEFULNESS	5	5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE	5	5	5	8	8	7	7	6	5
28. SMALL NON-INDUSTRIAL LANDOWNERS	5	5	4	5	4	4	5	4	4
29. PRIVATE, INDUSTRIAL LANDOWNERS	6	5	4	5	4	4	5	4	4
30. HIGH-VOLUME TIMBER MFG.	4	9	8	6	5	5	7	6	7
31. HIGH QUALITY TIMBER MFG	3	5	4	8	7	6	7	5	4
32. RECREATION INDUSTRY	5	1	2	7	7	6	6	4	2
33. LOW PUBLIC COSTS OF FOREST MGMT.	6	9	8	6	5	5	7	6	7
34. SCENIC & HISTORICAL VALUES	5	1	2	4	4	4	3	3	2
35. SPIRITUAL & CULTURAL VALUES	5	1	2	7	7	6	6	4	2

TABLE 1.5B. THE SOUTH--SUMMARY OF EFFECTS OF POLICY OPTIONS.

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	188	199	194	48	48	48	140	140	0
INTEGRATED AREA (millions of acres)	12	0	0	151	146	140	60	48	188
NON-COMMODITY AREA (millions of acres)	3	3	9	3	9	15	3	15	15
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	9.0	9.0	8.8	8.1	7.9	7.7	8.7	8.2	7.4
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	60	63	61	98	95	92	77	71	103
LUMBER & WOOD PRODUCTS	402	397	386	488	473	458	433	403	487
PAPER & ALLIED PRODUCTS	376	379	368	341	331	322	364	345	310
CARPENTERS	689	695	675	625	607	590	668	633	568
INDIRECT	1,536	1,535	1,491	1,552	1,507	1,462	1,542	1,451	1,467
TOTAL	3,071	3,070	2,981	3,104	3,014	2,923	3,084	2,903	2,934
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	0.1	-0.2	-0.8	-1.1	-1.3	-0.3	-0.7	-1.6
PUBLIC COST OF MANAGEMENT (billions of dollars)	0.5	0.5	1.8	1.2	2.0	3.3	0.8	3.2	3.4
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	9.4	11.2	10.4	9.6	8.9	8.6	8.9	8.2	7.4
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS		5	9	6	5	6	8	5	8
2. MINIMIZING NATIVE PESTS		5	9	6	5	6	8	5	8
3. MINIMIZING MAMMAL PESTS		5	9	6	5	6	8	5	8
4. MINIMIZING EXTREME FIRES		10	10	10	9	9	9	10	10
5. MINIMIZING OTHER "NATURAL" LOSSES		10	10	10	9	9	9	10	10
6. AVOIDING ATMOSPHERIC CO2 BUILDUP		10	6	8	9	8	6	10	6
7. CONSERVING FORESTS ABROAD		10	6	8	9	8	6	10	6
8. CONSERVING NATIVE FOREST TYPES		1	8	4	1	3	8	1	8
9. PROVIDING NATIVE SPECIES HABITATS		1	8	4	1	3	8	1	8
10. PROTECTING ENDANGERED SPECIES		5	9	6	5	6	8	5	9
11. AVOIDING INVASIVE EXOTIC SPECIES		5	9	6	5	6	8	5	9
12. MAINTAINING GENETIC DIVERSITY		5	9	7	5	7	9	5	9
13. MAINTAINING SITE QUALITY		5	9	6	5	6	8	5	9
14. SUSTAINING WATERSHEDS		5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE		5	9	7	5	7	9	5	9
16. TIMBER VOLUME		10	6	8	9	8	6	10	6
17. TIMBER QUALITY		5	9	6	5	6	8	5	8
18. SELECTED TIMBER SPECIES		10	6	8	9	8	6	10	6
19. NON-TIMBER PRODUCTS		5	9	6	5	6	8	5	8
20. RESERVE AREAS		1	1	1	2	2	2	1	1
21. REMOTE RECREATION		1	4	2	2	3	4	1	4
22. ACCESSIBLE RECREATION		5	9	6	5	6	8	5	8
23. COMMODITY-DEPENDENT LIFE STYLES		5	9	6	5	6	8	5	8
24. NON-COMMODITY LIFE STYLES		5	9	6	5	6	8	5	9
25. EMPLOYMENT & VALUE-ADDED		10	10	10	10	10	10	10	10
26. WATER VOLUMES & USEFULNESS		5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE		5	9	6	5	6	8	5	9
28. SMALL NON-INDUSTRIAL LANDOWNERS		5	5	5	5	5	5	5	5
29. PRIVATE, INDUSTRIAL LANDOWNERS		5	5	5	5	5	5	5	5
30. HIGH-VOLUME TIMBER MFG.		10	6	8	9	8	6	10	6
31. HIGH QUALITY TIMBER MFG		5	9	6	5	6	8	5	8
32. RECREATION INDUSTRY		1	8	4	1	3	8	1	8
33. LOW PUBLIC COSTS OF FOREST MGMT.		10	6	8	9	8	6	10	6
34. SCENIC & HISTORICAL VALUES		1	4	2	1	2	4	1	4
35. SPIRITUAL & CULTURAL VALUES		1	8	4	1	3	8	1	8

TABLE 1.5C. THE NORTH--SUMMARY OF EFFECTS OF POLICY OPTIONS .

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	148	158	153	37	37	37	111	111	0
INTEGRATED AREA (millions of acres)	10	0	0	121	116	111	47	37	148
NON-COMMODITY AREA (millions of acres)	8	8	12	8	12	17	8	17	17
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	2.8	5.2	5.0	4.7	4.5	4.4	5.0	4.7	4.2
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	22	36	35	57	55	53	44	40	59
LUMBER & WOOD PRODUCTS	126	229	222	281	272	263	249	231	279
PAPER & ALLIED PRODUCTS	117	218	212	196	190	185	210	198	178
CARPENTERS	215	400	388	359	349	338	385	364	326
INDIRECT	481	884	857	894	866	839	887	833	842
TOTAL	962	1,767	1,714	1,787	1,733	1,679	1,775	1,666	1,685
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	2.4	2.3	1.9	1.7	1.6	2.2	1.9	1.4
PUBLIC COST OF MANAGEMENT (billions of dollars)	0.8	0.7	0.7	1.3	1.3	1.2	1.0	0.9	1.4
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	3.3	18.5	17.4	18.2	17.1	16.0	18.2	16.0	15.7
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS		5	8	6	5	6	8	5	8
2. MINIMIZING NATIVE PESTS		5	8	6	5	6	8	5	8
3. MINIMIZING MAMMAL PESTS		5	8	6	5	6	8	5	8
4. MINIMIZING EXTREME FIRES		10	10	10	9	9	9	9	9
5. MINIMIZING OTHER "NATURAL" LOSSES		10	10	10	9	9	9	9	9
6. AVOIDING ATMOSPHERIC CO2 BUILDUP		10	6	8	9	8	6	9	6
7. CONSERVING FORESTS ABROAD		10	6	8	9	8	6	9	6
8. CONSERVING NATIVE FOREST TYPES		1	8	4	1	3	7	1	8
9. PROVIDING NATIVE SPECIES HABITATS		1	8	4	1	3	7	1	8
10. PROTECTING ENDANGERED SPECIES		5	9	6	5	6	8	5	9
11. AVOIDING INVASIVE EXOTIC SPECIES		5	9	6	5	6	8	5	9
12. MAINTAINING GENETIC DIVERSITY		5	9	7	6	7	9	5	9
13. MAINTAINING SITE QUALITY		5	9	6	5	6	8	5	9
14. SUSTAINING WATERSHEDS		5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE		5	9	7	6	7	9	5	9
16. TIMBER VOLUME		10	6	8	9	8	6	9	6
17. TIMBER QUALITY		5	8	6	5	6	8	5	8
18. SELECTED TIMBER SPECIES		10	6	8	9	8	6	9	6
19. NON-TIMBER PRODUCTS		5	8	6	5	6	8	5	8
20. RESERVE AREAS		1	1	1	2	2	2	2	2
21. REMOTE RECREATION		1	4	3	2	3	5	2	4
22. ACCESSIBLE RECREATION		5	8	6	5	6	8	5	8
23. COMMODITY-DEPENDENT LIFE STYLES		5	8	6	5	6	8	5	8
24. NON-COMMODITY LIFE STYLES		5	9	6	5	6	8	5	9
25. EMPLOYMENT & VALUE-ADDED		10	10	10	9	9	9	10	10
26. WATER VOLUMES & USEFULNESS		5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE		5	9	6	5	6	8	5	9
28. SMALL NON-INDUSTRIAL LANDOWNERS		5	5	5	5	5	5	5	5
29. PRIVATE, INDUSTRIAL LANDOWNERS		5	5	5	5	5	5	5	5
30. HIGH-VOLUME TIMBER MFG.		10	6	8	9	8	6	9	6
31. HIGH QUALITY TIMBER MFG		5	8	6	5	6	8	5	8
32. RECREATION INDUSTRY		1	8	4	1	3	7	1	8
33. LOW PUBLIC COSTS OF FOREST MGMT.		10	6	8	9	8	6	9	6
34. SCENIC & HISTORICAL VALUES		1	4	2	1	2	4	1	4
35. SPIRITUAL & CULTURAL VALUES		1	8	4	1	3	7	1	8

TABLE 1.5D. THE INLAND WEST--SUMMARY OF EFFECTS OF POLICY OPTIONS.

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	26	63	44	9	9	9	17	17	0
INTEGRATED AREA (millions of acres)	36	0	0	54	36	17	45	9	26
NON-COMMODITY AREA (millions of acres)	12	12	30	12	30	49	12	49	49
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	0.8	2.1	1.5	1.9	1.4	0.8	1.9	0.9	0.8
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	11	15	11	24	17	9	23	8	11
LUMBER & WOOD PRODUCTS	45	94	67	119	83	47	115	44	51
PAPER & ALLIED PRODUCTS	35	90	64	80	57	34	81	36	33
CARPENTERS	64	165	117	146	105	63	149	66	60
INDIRECT	156	365	259	369	262	154	368	153	155
TOTAL	311	729	517	738	523	308	737	307	310
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	1.3	0.7	1.1	0.5	0.0	1.1	0.0	0.0
PUBLIC COST OF MANAGEMENT (billions of dollars)	1.2	1.0	0.9	1.3	1.1	1.0	1.3	0.9	1.0
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	1.4	7.1	4.1	6.6	3.8	1.1	6.5	1.1	1.0
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS		4	8	7	2	3	4	3	6
2. MINIMIZING NATIVE PESTS		4	8	7	2	3	4	3	6
3. MINIMIZING MAMMAL PESTS		4	8	7	2	3	4	3	6
4. MINIMIZING EXTREME FIRES		9	9	9	4	4	4	6	6
5. MINIMIZING OTHER "NATURAL" LOSSES		9	9	9	4	4	4	6	6
6. AVOIDING ATMOSPHERIC CO2 BUILDUP		9	5	6	4	4	3	6	4
7. CONSERVING FORESTS ABROAD		9	5	6	4	4	3	6	4
8. CONSERVING NATIVE FOREST TYPES		2	8	7	4	5	6	3	7
9. PROVIDING NATIVE SPECIES HABITATS		2	8	7	4	5	6	3	7
10. PROTECTING ENDANGERED SPECIES		5	9	8	5	6	6	5	7
11. AVOIDING INVASIVE EXOTIC SPECIES		5	9	8	5	6	6	5	7
12. MAINTAINING GENETIC DIVERSITY		6	9	9	8	9	9	7	9
13. MAINTAINING SITE QUALITY		5	9	8	5	6	6	5	7
14. SUSTAINING WATERSHEDS		5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE		6	9	9	8	9	9	7	9
16. TIMBER VOLUME		9	5	6	4	4	3	6	4
17. TIMBER QUALITY		4	8	7	2	3	4	3	6
18. SELECTED TIMBER SPECIES		9	5	6	4	4	3	6	4
19. NON-TIMBER PRODUCTS		4	8	7	2	3	4	3	6
20. RESERVE AREAS		2	2	2	7	7	7	5	5
21. REMOTE RECREATION		2	5	5	7	7	8	5	7
22. ACCESSIBLE RECREATION		4	8	7	2	3	4	3	6
23. COMMODITY-DEPENDENT LIFE STYLES		4	8	7	2	3	4	3	6
24. NON-COMMODITY LIFE STYLES		5	9	8	5	6	6	5	7
25. EMPLOYMENT & VALUE-ADDED		9	9	9	7	7	7	8	8
26. WATER VOLUMES & USEFULNESS		5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE		5	9	8	5	6	6	5	7
28. SMALL NON-INDUSTRIAL LANDOWNERS		4	4	4	2	2	2	3	3
29. PRIVATE, INDUSTRIAL LANDOWNERS		4	4	4	2	2	2	3	3
30. HIGH-VOLUME TIMBER MFG.		9	5	6	4	4	3	6	4
31. HIGH QUALITY TIMBER MFG		4	8	7	2	3	4	3	6
32. RECREATION INDUSTRY		2	8	7	4	5	6	3	7
33. LOW PUBLIC COSTS OF FOREST MGMT.		9	5	6	4	4	3	6	4
34. SCENIC & HISTORICAL VALUES		2	5	4	4	4	5	3	5
35. SPIRITUAL & CULTURAL VALUES		2	8	7	4	5	6	3	7

TABLE 1.5E. THE PACIFIC COAST--SUMMARY OF EFFECTS OF POLICY OPTIONS.

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	31	55	43	18	18	18	13	13	0
INTEGRATED AREA (millions of acres)	23	0	0	36	25	13	42	18	31
NON-COMMODITY AREA (millions of acres)	7	7	18	7	18	30	7	30	30
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	3.5	3.6	2.8	3.3	2.6	1.9	3.2	1.9	1.8
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	31	25	20	37	28	19	39	21	25
LUMBER & WOOD PRODUCTS	176	158	125	190	146	102	195	107	118
PAPER & ALLIED PRODUCTS	147	151	119	138	110	82	136	80	75
CARPENTERS	270	277	218	253	201	150	249	146	138
INDIRECT	627	612	481	618	485	353	619	354	356
TOTAL	1,254	1,224	963	1,236	971	706	1,238	707	712
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	0.1	-0.7	-0.2	-0.9	-1.6	-0.3	-1.6	-1.7
PUBLIC COST OF MANAGEMENT (billions of dollars)	0.8	1.1	5.0	1.1	5.0	8.9	1.1	8.9	8.9
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	5.1	6.0	4.3	5.3	3.9	2.4	5.1	2.3	2.2
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS		5	8	8	3	5	4	4	6
2. MINIMIZING NATIVE PESTS		5	8	8	3	5	4	4	6
3. MINIMIZING MAMMAL PESTS		5	8	8	3	5	4	4	6
4. MINIMIZING EXTREME FIRES		9	9	9	6	6	6	7	7
5. MINIMIZING OTHER "NATURAL" LOSSES		9	9	9	6	6	6	7	7
6. AVOIDING ATMOSPHERIC CO2 BUILDUP		9	6	6	6	4	5	7	5
7. CONSERVING FORESTS ABROAD		9	6	6	6	4	5	7	5
8. CONSERVING NATIVE FOREST TYPES		1	7	8	3	6	5	2	6
9. PROVIDING NATIVE SPECIES HABITATS		1	6	7	2	5	5	1	6
10. PROTECTING ENDANGERED SPECIES		5	8	8	5	6	6	5	7
11. AVOIDING INVASIVE EXOTIC SPECIES		5	8	8	5	6	6	5	7
12. MAINTAINING GENETIC DIVERSITY		6	9	9	7	9	9	6	9
13. MAINTAINING SITE QUALITY		5	8	8	5	6	6	5	7
14. SUSTAINING WATERSHEDS		5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE		6	9	9	7	9	9	6	9
16. TIMBER VOLUME		9	6	6	6	4	5	7	5
17. TIMBER QUALITY		5	8	8	3	5	4	4	6
18. SELECTED TIMBER SPECIES		9	6	6	6	4	5	7	5
19. NON-TIMBER PRODUCTS		5	8	8	3	5	4	4	6
20. RESERVE AREAS		2	2	2	5	5	5	4	4
21. REMOTE RECREATION		2	4	5	5	7	6	4	5
22. ACCESSIBLE RECREATION		5	8	8	3	5	4	4	6
23. COMMODITY-DEPENDENT LIFE STYLES		5	8	8	3	5	4	4	6
24. NON-COMMODITY LIFE STYLES		5	8	8	5	6	6	5	7
25. EMPLOYMENT & VALUE-ADDED		9	9	9	8	8	8	9	9
26. WATER VOLUMES & USEFULNESS		5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE		5	8	8	5	6	6	5	7
28. SMALL NON-INDUSTRIAL LANDOWNERS		5	5	5	3	3	3	4	4
29. PRIVATE, INDUSTRIAL LANDOWNERS		5	5	5	3	3	3	4	4
30. HIGH-VOLUME TIMBER MFG.		9	6	6	6	4	5	7	5
31. HIGH QUALITY TIMBER MFG		5	8	8	3	5	4	4	6
32. RECREATION INDUSTRY		1	7	8	3	6	5	2	6
33. LOW PUBLIC COSTS OF FOREST MGMT.		9	6	6	6	4	5	7	5
34. SCENIC & HISTORICAL VALUES		1	4	4	3	4	4	2	4
35. SPIRITUAL & CULTURAL VALUES		1	7	8	3	6	5	2	6

TABLE 1.5F. ALASKA--SUMMARY OF EFFECTS OF POLICY OPTIONS.

	POLICY OPTIONS								
	PRESENT	OPTION # 1	OPTION # 2	OPTION # 3	OPTION # 4	OPTION # 5	OPTION # 6	OPTION # 7	OPTION # 8
AREA IN EACH APPROACH									
TIMBER MANAGEMENT AREA (millions of acres)	11	15	13	5	5	5	6	6	0
INTEGRATED AREA (millions of acres)	4	0	0	10	8	6	9	5	11
NON-COMMODITY AREA (millions of acres)	6	6	8	6	8	10	6	10	10
SELECTED ECONOMIC MEASURES									
TIMBER HARVEST VOLUME (billion FT3/year)	0.2	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.2
EMPLOYMENT (thousands of people)									
FORESTRY & LOGGING	5	2	2	4	3	3	4	2	3
LUMBER & WOOD PRODUCTS	13	16	14	19	16	14	18	13	15
PAPER & ALLIED PRODUCTS	10	15	13	14	12	10	14	11	10
CARPENTERS	18	27	24	25	22	19	25	19	18
INDIRECT	47	61	53	61	54	46	61	46	46
TOTAL	93	121	106	123	107	92	122	92	92
NET TIMBER IMPORT(-) OR EXPORT (+) (billion FT3/year)	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0
PUBLIC COST OF MANAGEMENT (billions of dollars)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
PUBLIC RETURN FROM MANAGEMENT (billions of dollars)3	0.4	0.8	0.6	0.8	0.6	0.4	0.8	0.4	0.3
ESTIMATED RELATIVE CONTRIBUTION OF THE APPROACH TO INCREASING THE POTENTIAL AND/OR REALIZATION OF VALUES IN TABLE 1.1. (1=lowest; 10=highest)									
1. MINIMIZING EXOTIC PESTS		4	6	6	3	4	5	3	5
2. MINIMIZING NATIVE PESTS		4	6	6	3	4	5	3	5
3. MINIMIZING MAMMAL PESTS		4	6	6	3	4	5	3	5
4. MINIMIZING EXTREME FIRES		7	7	7	6	6	6	7	7
5. MINIMIZING OTHER "NATURAL" LOSSES		7	7	7	6	6	6	7	7
6. AVOIDING ATMOSPHERIC CO2 BUILDUP		7	5	5	6	5	4	7	5
7. CONSERVING FORESTS ABROAD		7	5	5	6	5	4	7	5
8. CONSERVING NATIVE FOREST TYPES		2	6	6	3	5	5	3	6
9. PROVIDING NATIVE SPECIES HABITATS		2	6	6	3	5	5	3	6
10. PROTECTING ENDANGERED SPECIES		5	7	7	5	6	6	5	7
11. AVOIDING INVASIVE EXOTIC SPECIES		5	7	7	5	6	6	5	7
12. MAINTAINING GENETIC DIVERSITY		6	9	9	7	9	9	7	9
13. MAINTAINING SITE QUALITY		5	7	7	5	6	6	5	7
14. SUSTAINING WATERSHEDS		5	5	5	5	5	5	5	5
15. MAINTAINING FOREST LAND BASE		6	9	9	7	9	9	7	9
16. TIMBER VOLUME		7	5	5	6	5	4	7	5
17. TIMBER QUALITY		4	6	6	3	4	5	3	5
18. SELECTED TIMBER SPECIES		7	5	5	6	5	4	7	5
19. NON-TIMBER PRODUCTS		4	6	6	3	4	5	3	5
20. RESERVE AREAS		4	4	4	5	5	5	4	4
21. REMOTE RECREATION		4	5	5	5	6	6	4	6
22. ACCESSIBLE RECREATION		4	6	6	3	4	5	3	5
23. COMMODITY-DEPENDENT LIFE STYLES		4	6	6	3	4	5	3	5
24. NON-COMMODITY LIFE STYLES		5	7	7	5	6	6	5	7
25. EMPLOYMENT & VALUE-ADDED		9	9	9	8	8	8	8	8
26. WATER VOLUMES & USEFULNESS		5	5	5	5	5	5	5	5
27. GAME & NON-GAME FISH & WILDLIFE		5	7	7	5	6	6	5	7
28. SMALL NON-INDUSTRIAL LANDOWNERS		4	4	4	3	3	3	3	3
29. PRIVATE, INDUSTRIAL LANDOWNERS		4	4	4	3	3	3	3	3
30. HIGH-VOLUME TIMBER MFG.		7	5	5	6	5	4	7	5
31. HIGH QUALITY TIMBER MFG		4	6	6	3	4	5	3	5
32. RECREATION INDUSTRY		2	6	6	3	5	5	3	6
33. LOW PUBLIC COSTS OF FOREST MGMT.		7	5	5	6	5	4	7	5
34. SCENIC & HISTORICAL VALUES		2	4	4	3	4	4	3	4
35. SPIRITUAL & CULTURAL VALUES		2	6	6	3	5	5	3	6

Table 1.6. Assumed effects of each approach on timber harvest, employment, costs, and other values. (These values are considered relative and for comparisons only. Explanations of origins of numbers, and alternative sources, are described in Table 1.7.)

--TIMBER HARVEST:

"Economic efficiency" approach: 75% of gross growth, by region.
"Integrated" approach: 65% of gross growth, by region.
"No commodity" approach: No timber harvest.

--U.S. CONSUMPTION OF TIMBER: 16.3 billion cubic feet/year

--EMPLOYMENT:[1] Employment is divided into "Direct" and "Indirect" categories:

DIRECT EMPLOYMENT: There are four types of direct employment.
Forest Management and Timber Harvest (Presently 129,000 people employed):
"Economic efficiency" approach: 7 people/ million cubic feet
"Integrated" approach: 14 people/million cubic feet
"No commodity" approach: 1 person/40,000 acres/year.
Lumber and Wood Products (Presently 752,000 people employed[2]):
"Economic efficiency" approach: 44 people/ million cubic feet
"Integrated" approach: 66 people/million cubic feet
"No commodity" approach: 0 people
Paper and Allied Products (Presently 691,000 people employed):
"Economic efficiency" approach: 42 people/ million cubic feet
"Integrated" approach: 42 people/million cubic feet
"No commodity" approach: 0 people
Carpenters (Presently 1,255,000 people employed):
"Economic efficiency" approach: 77 people/ million cubic feet
"Integrated" approach: 77 people/million cubic feet
"No commodity" approach: 0 people

INDIRECT EMPLOYMENT: This employment assumes one indirect job per direct job.

--MANAGEMENT COSTS (including taxes or payments in place of taxes
"Economic efficiency" approach: $20/acre/year
"Integrated" approach: $25/acre/year
"No commodity" approach: $ 15/acre/year

--STUMPAGE VALUES:
"Economic efficiency" approach: $ 1,250/thousand cubic feet
"Integrated" approach: $1,125/thousand cubic feet

--TAX RECEIPTS GENERATED: $ 1/cubic foot of timber harvested

--REDUCED GOVERNMENT COST BY EMPLOYMENT: $15,000/person/year
If employment exceeds present levels, extra employment is added as a return to government; lower employment is considered a cost to government.

[1] Employment in recreation is not considered, but may be similar under all management approaches, since much of the recreation employment is in "accessible recreation."

Table 1.7. Explanations of numbers shown in Table 1.6. Numbers shown in Table 1.6 are shown in boxes. Sources of numbers are listed below it, along with other possible numbers. As can be seen, the numbers vary by source and assumptions; however, the trends shown in this report are quite robust. Attempts were made to be conservative in estimating present condition and impacts.

--TIMBER HARVEST:

"Economic efficiency" approach: 75% of gross growth, by region.
"Integrated" approach: 65% of gross growth, by region.
"No commodity" approach: No timber harvest.

75% of gross growth is considered the maximum sustainable, because mortality of individual trees in stands which are often not economically recovered; and because some forests are inaccessible because of terrain & ownership contraints.

As of 1992 (Powell et al. 1993), the South & Pacific Coast were harvesting about 75% of their gross growth, which is probably near the maximum harvest which is economically feasible.

This study estimated a harvest of about 87% of "economic efficiency" using the "integrated management" approach. This estimate is conservative, compared to the estimates described below:

Lippke et al. (1996) showed the following average, sustainable harvest by 3 treatments:

Approach:	"Economic efficiency"	First "integrated" approach	Second"integrated" approach
thou.cubic ft./acre/yr	2,100	1,780	1,800
% of "economic efficiency"	100%	91.5%	91.6%

--U.S. CONSUMPTION OF TIMBER: 16.3 billion cubic feet/year

The United States seems to be vacillating between a net importing of timber and a balance of importing and exporting of timber. Much of the export is in pulp and paper products, while the import is largely softwood lumber, pulp, and newsprint Brooks (1995). More recent, unpublished U.S.D.A. Forest Service data estimated the United States is presently approximately balanced in import and export of forest products. Consequently, its consumption is assumed to equal its production (Powell et al. 1993).

(Continued on next page)

DIRECT EMPLOYMENT: There are four types of direct employment.
Forest Management and Timber Harvest (Presently 129,000 people employed[1]):
"Economic efficiency" approach: 7 people/ million cubic feet
"Integrated" approach: 14 people/million cubic feet
"No commodity" approach: 1 person/40,000 acres/year.[2]
Lumber and Wood Products (Presently 752,000 people employed[3]):
"Economic efficiency" approach: 44 people/ million cubic feet
"Integrated" approach: 66 people/million cubic feet
"No commodity" approach: 0 people
Paper and Allied Products (Presently 691,000 people employed):
"Economic efficiency" approach: 42 people/ million cubic feet
"Integrated" approach: 42 people/million cubic feet
"No commodity" approach: 0 people
Carpenters (Presently 1,255,000 people employed):
"Economic efficiency" approach: 77 people/ million cubic feet
"Integrated" approach: 77 people/million cubic feet
"No commodity" approach: 0 people
INDIRECT EMPLOYMENT: This employment assumes one indirect job per direct job.

Calculation of direct employment:

This estimate of direct employment was from Statistical Yearbook, 1996.

Forest Management and Timber Harvest	**129,000 people employed**
Lumber and Wood Products	**752,000 people employed**
Paper and Allied Products	**691,000 people employed**
Carpenters (Presently	**1,255,000 people employed**
Total	**2,827,000 people employed**

Estimates of direct employment per cubic feet were obtained by dividing the numbers above by the present national timber volume production for "Economic efficiency" management.

Employment in forest management and timber harvest were assumed to double under "integrated management" (based on comparisons below) and employment in lumber and wood products was assumed to increase by one third because of the higher quality timber produced through "integrated management" with more thinnings and longer rotations.

An alternative estimate of direct employment was obtained for the Inland West by personal telephone calls and Bureau of Labor Statistics,Employment, and Wages Annual Averages (1994), Keegan et al. (1996), and USDA Forest Service TSPIRS (1987). This data is as follows:

"Economic efficiency" 60,000 cubic feet to 111,110 cubic feet/person/year.
"Integrated management" 15,100 cubic feet/person/year.
"No commodity" approach: 20,000 to 65,000 acres/person/year.

(Continued on next page)

[1] Data from Statistical Yearbook, U.S.Dept. of Interior, 1996. (Different sources of data may give varying results.)
[2] Values based on information from Inland West and Pacific Northwest public lands.
[3] This assumes slightly more value added employment with integrated management.

Another alternative estimate of direct employment by management approach was obtained from Lippke et al. (1996) for western Wshingon:

"Economic efficiency"	**5 people/acre/year**
"Integrated management"	**8 people/acre/year**

Another estimate of direct employment in forestry and forest products is from the American Forest and Paper Association (1990), from data maintained by the U.S.Dept. of Commerce.

Forestry employment	**59,100 people**
Paper employment	**701,800 people**
Lumber employment	**852,200 people**
Total	**1,613,100 people**

Another estimate of total direct employment (not including carpenters and less direct manufacturing) for the Inland West is from Oliver and Lippke (1994):

"Economic efficiency":	**45 people/ million cubic feet/year**
"Integrated management":	**40 people/million cubic feet/year**

<u>Estimates of indirect employment for direct employment are:</u>

For Pacific Northwest (Conway; 1994):
5 indirect jobs per direct job
For South (Cubbage and Aruna 1996):
1.5 to 2 indirect jobs per direct job

Because some of the indirect jobs would be maintained if the United States imported its timber and/or various manufactured wood products or used substitute products, this report assumes one indirect job per direct job is impacted in forestry.

--MANAGEMENT COSTS (including taxes or payments in place of taxes

"Economic efficiency" approach:	**$20/acre/year**
"Integrated" approach:	**$25/acre/year**
"No commodity" approach:	**$ 15/acre/year**

From Oliver & Lippke

	Timber mgmt	**Integrated mgmt**
Costs (excluding payments in place of taxes.)	**$ 4.81/acre/yr.**	**$ 8.94/acre/yr**
Payments in place of taxes $ 15.42.		

USDA Forest Service Wilderness staff budget is currently approximately $1/acre/year, but does not include payments in place of taxes, fire fighting, or possibly recreation and wildlife budgets. Also, these Wilderness Areas contain large areas of rock and ice (unproductive forests or non-forested).

(Table 1.7, continued on next page)

--STUMPAGE VALUES:

"Economic efficiency" approach: $ 1,250/thousand cubic feet

"Integrated" approach: $1,125/thousand cubic feet

Estimates of stumpage vlues from Oliver & Lippke (1994) for the Inland West:

		Timber mgmt	Integrated mgmt
Stumpage values		**$ 536/thousand cubic feet**	**$ 425/thousnd cubic feet**
	or	**$ 1,072/thousand cubic feet**	

Estimates of stumpage values from Lippke et al. (1996) for western Washington:

	Timber mgmt	Integrated mgmt
thinnings		**$ 1,400/thousand cubic feet**
final harvest	**$ 1,950/thousand cubic feet**	**$ 2,300/thousand cubic feet**
av:	**$ 1,950/thousand cubic feet**	**$ 2,000/thousand cubic feet**

("Integrated management" removes more wood in final harvest than in thinnings)

--TAX RECEIPTS GENERATED: $ 1/cubic foot of timber harvested

From Lippke et al.(1996) for Washington State: $ 180,000/200,000 cubic feet harvested) These include federal and state tax receipts from total economic activity generated. Thinning actually generated much higher tax receipts, according to the calculations.

--REDUCED GOVERNMENT COST BY EMPLOYMENT: $15,000/person/year

From Lippke et al. (1996)

If employment exceeds present levels, extra employment is added as a return to government; lower employment is considered a cost to government.

SUMMARY

SECTION 2: EFFECT OF POLICY OPTIONS 1 THROUGH 8 ON THE UNITED STATES, ORGANIZED BY OPTION

OPTION #1:

FIGURE 2.1. Area under management by region

TABLE 2.1. Summary information

TABLE 2.1.1. Area under each management approach by region & ownership

FIGURE 2..1.2A. Effect of policy option # 1 on potential to achieve conditions

FIGURE 2.1.2B. Effect of policy option # 1 on the forest's potential to provide various values

OPTION #2:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION #3:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION #4:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION #5:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION # 6:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION #7:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

OPTION #8:

(FIGURES AND TABLES IN SAME FORMAT AS OPTION #1)

FIGURE 2.1. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #1.

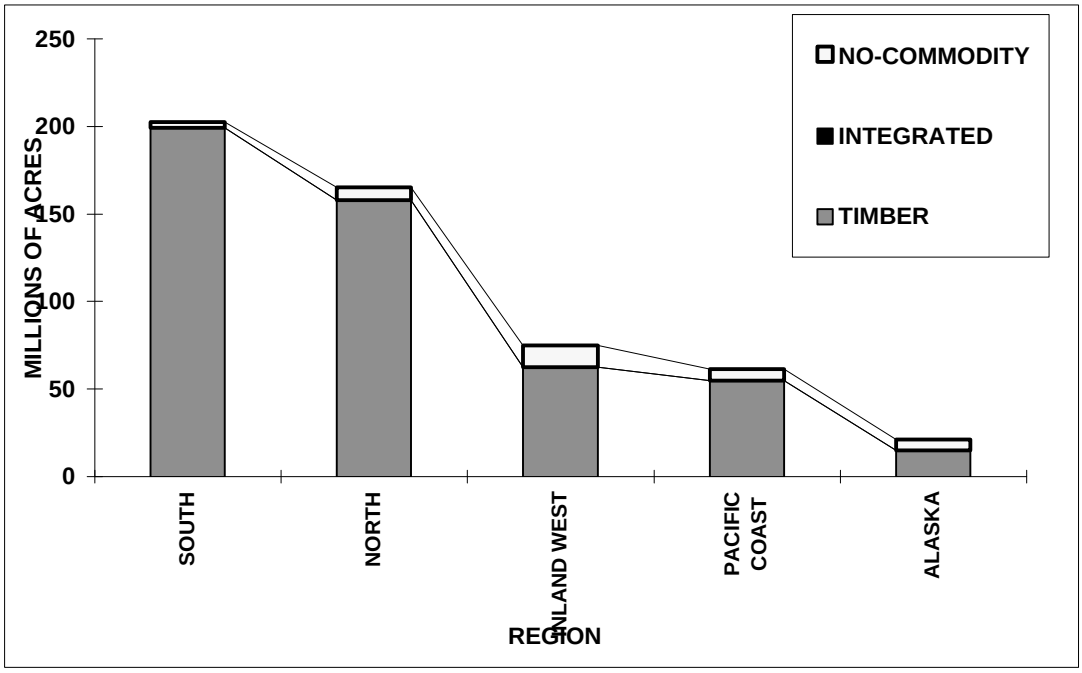


TABLE 2.1. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #1

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	20.3	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	143	129
LUMBER & WOOD PRODUCTS	895	752
PAPER & ALLIED PRODUCTS	854	691
CARPENTERS	1,565	1,255
INDIRECT	3,457	2,827
TOTAL	6,914	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	4.0	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	3.2	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	46.1	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	490	404
INTEGRATED AREA		
(millions of acres)	0	85
NON-COMMODITY AREA		
(millions of acres)	36	36

1 Does not include income generated from recreation. See text for details.
2 Estimated by this strategy. See text for assumptions.
3 Many values estimated from Table 1.6.

TABLE 2.1.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #1. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	10	0	0	10
Other Public	21	0	0	21
Forest Industry	16	0	0	16
Nonindustrial private	111	0	0	111
All Ownerships	158	0	8	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	12	0	0	12
Other Public	9	0	0	9
Forest Industry	39	0	0	39
Nonindustrial private	140	0	0	140
All Ownerships	199	0	3	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	36	0	0	36
Other Public	6	0	0	6
Forest Industry	3	0	0	3
Nonindustrial private	17	0	0	17
All Ownerships	63	0	12	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	23	0	0	23
Other Public	6	0	0	6
Forest Industry	12	0	0	12
Nonindustrial private	13	0	0	13
All Ownerships	55	0	7	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	4	0	0	4
Other Public	5	0	0	5
Forest Industry	0	0	0	0
Nonindustrial private	6	0	0	6
All Ownerships	15	0	6	21

FIGURE 2.1.2A. UNITED STATES--EFFECT OF POLICY OPTION #1 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

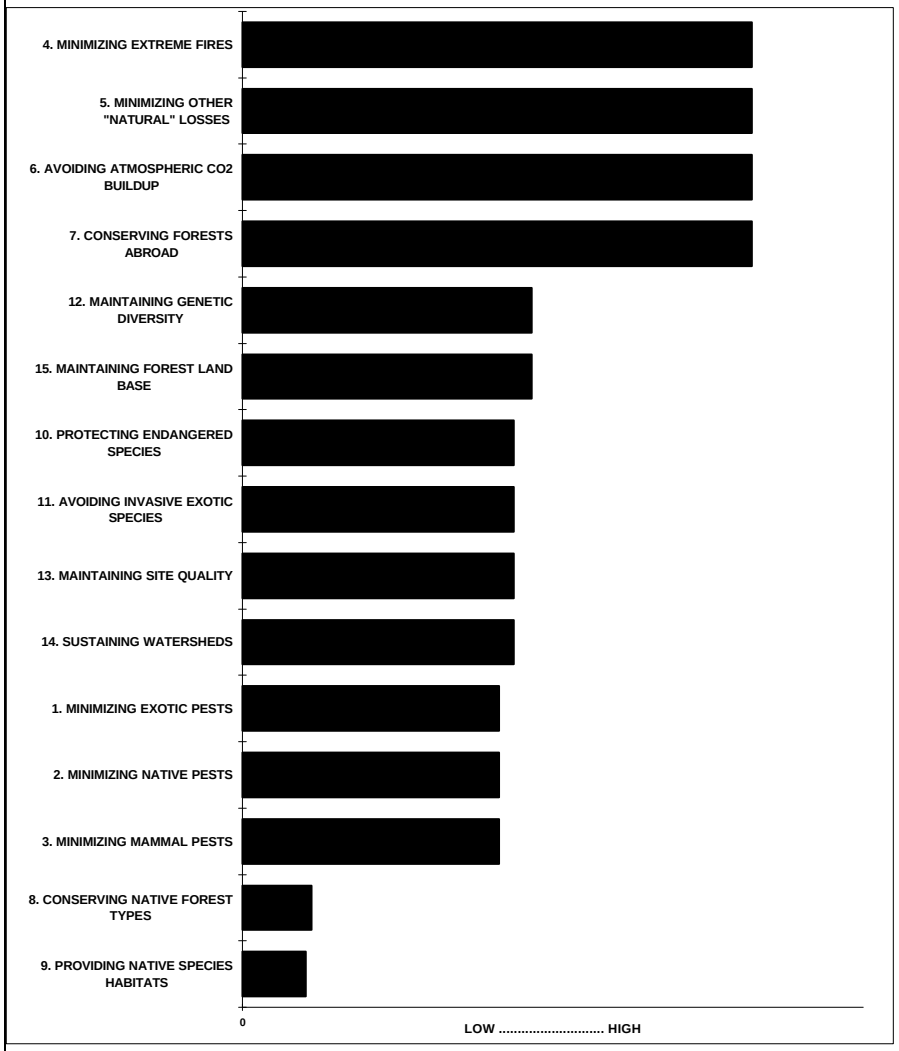
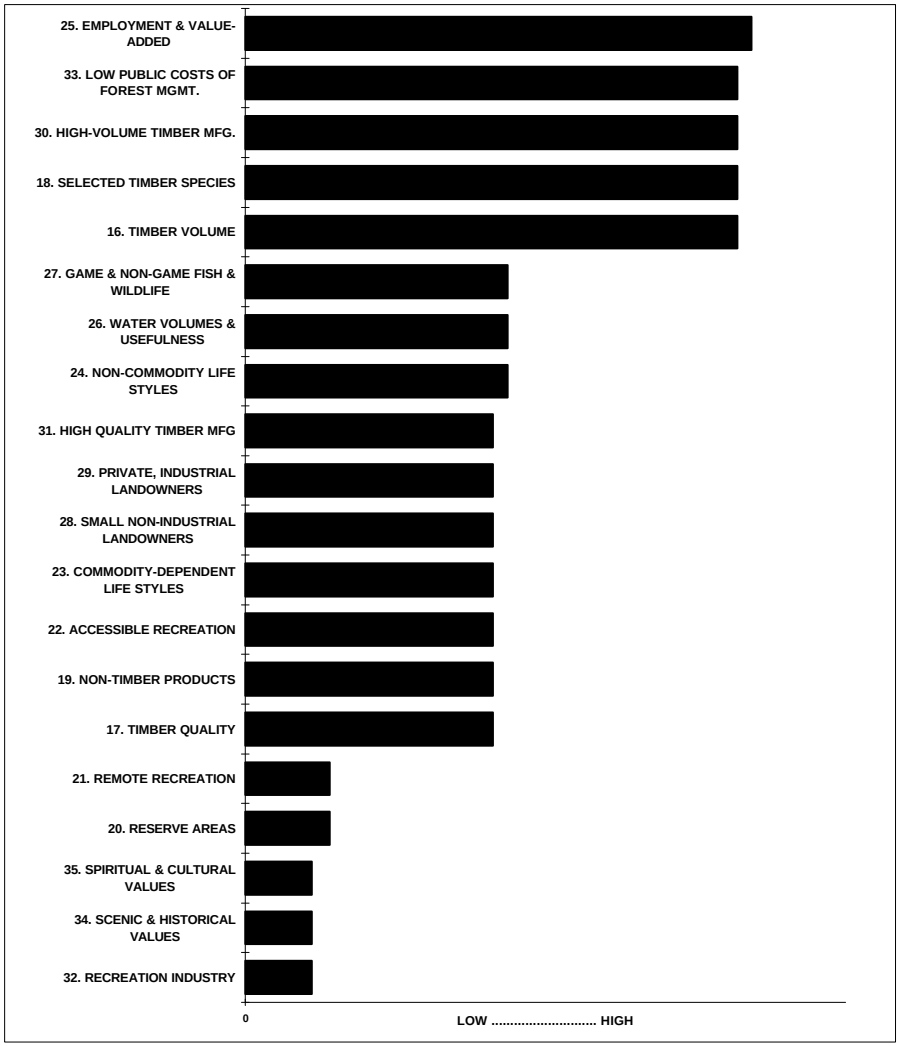


FIGURE 2.1.2B. UNITED STATES: EFFECT OF POLICY OPTION #1 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.2. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #2.

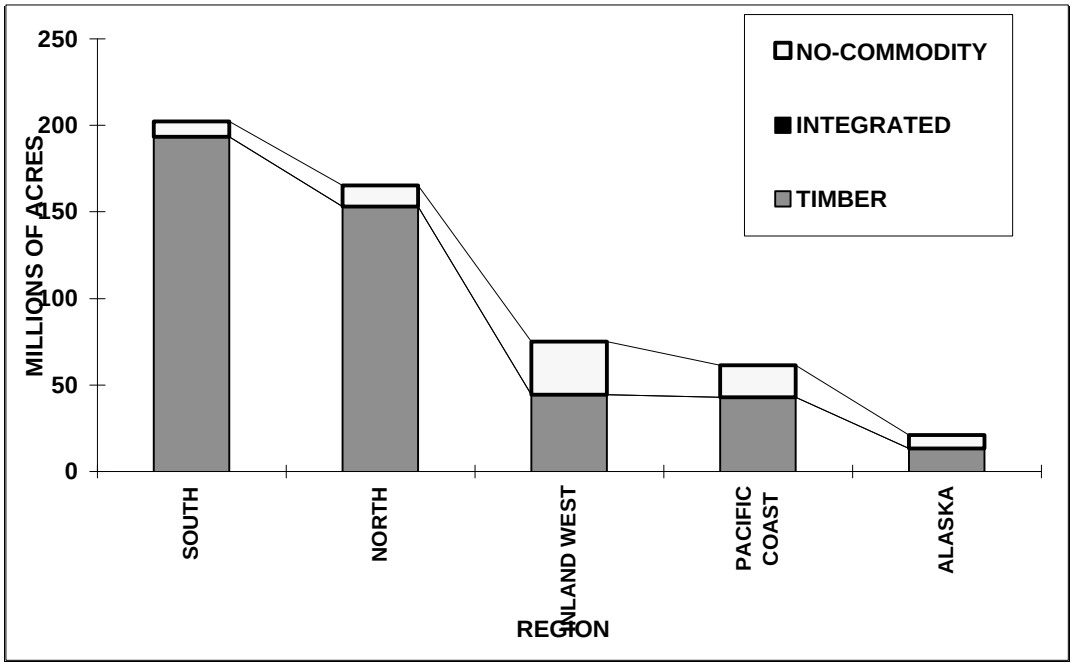


TABLE 2.2. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #2

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	18.5	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	131	129
LUMBER & WOOD PRODUCTS	813	752
PAPER & ALLIED PRODUCTS	776	691
CARPENTERS	1,423	1,255
INDIRECT	3,143	2,827
TOTAL	6,285	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	2.2	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	3.0	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	32.5	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	447	404
INTEGRATED AREA		
(millions of acres)	0	85
NON-COMMODITY AREA		
(millions of acres)	78	36

1 Does not include income generated from recreation. See text for details.

2 Estimated by this strategy. See text for assumptions.

3 Many values estimated from Table 1.6.

TABLE 2.2.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #2. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	5	0	5	10
Other Public	21	0	0	21
Forest Industry	16	0	0	16
Nonindustrial private	111	0	0	111
All Ownerships	153	0	12	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	6	0	6	12
Other Public	9	0	0	9
Forest Industry	39	0	0	39
Nonindustrial private	140	0	0	140
All Ownerships	194	0	9	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	18	0	18	36
Other Public	6	0	0	6
Forest Industry	3	0	0	3
Nonindustrial private	17	0	0	17
All Ownerships	44	0	30	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	12	0	12	23
Other Public	6	0	0	6
Forest Industry	12	0	0	12
Nonindustrial private	13	0	0	13
All Ownerships	43	0	18	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	2	0	2	4
Other Public	5	0	0	5
Forest Industry	0	0	0	0
Nonindustrial private	6	0	0	6
All Ownerships	13	0	8	21

FIGURE 2.2.2A. UNITED STATES--EFFECT OF POLICY OPTION #2 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

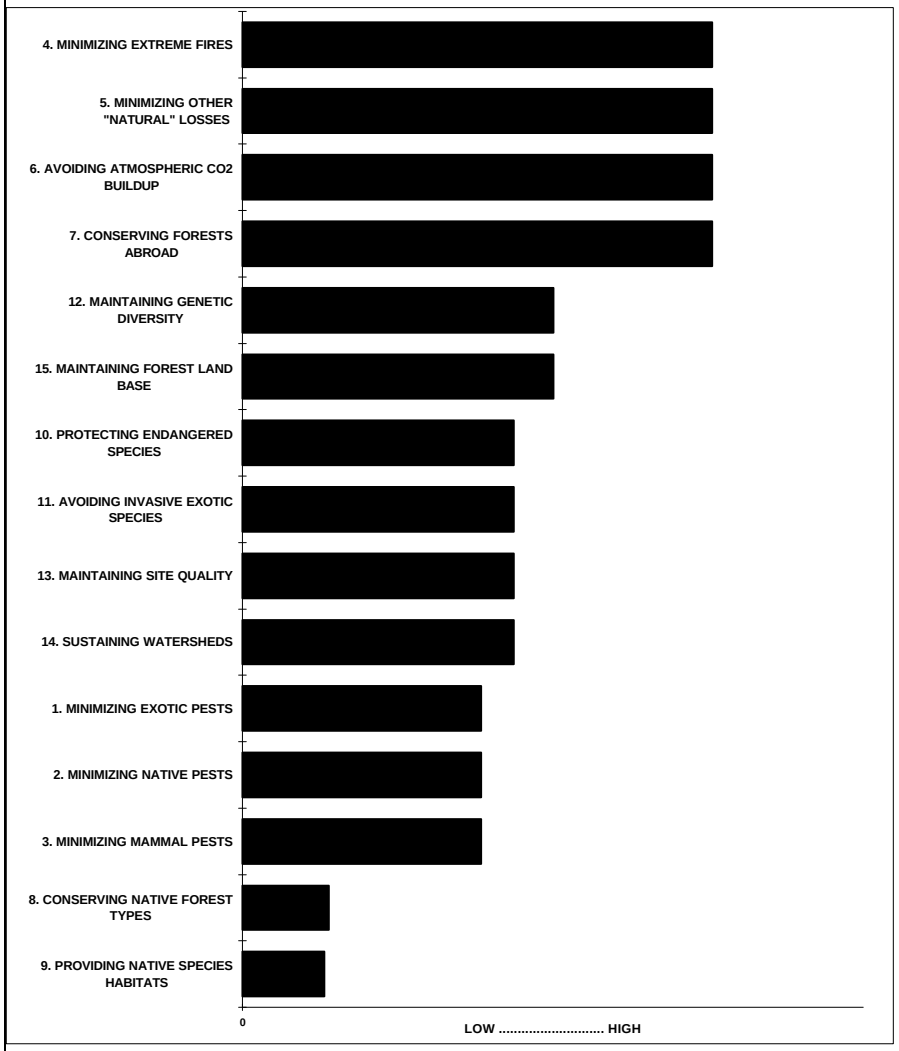
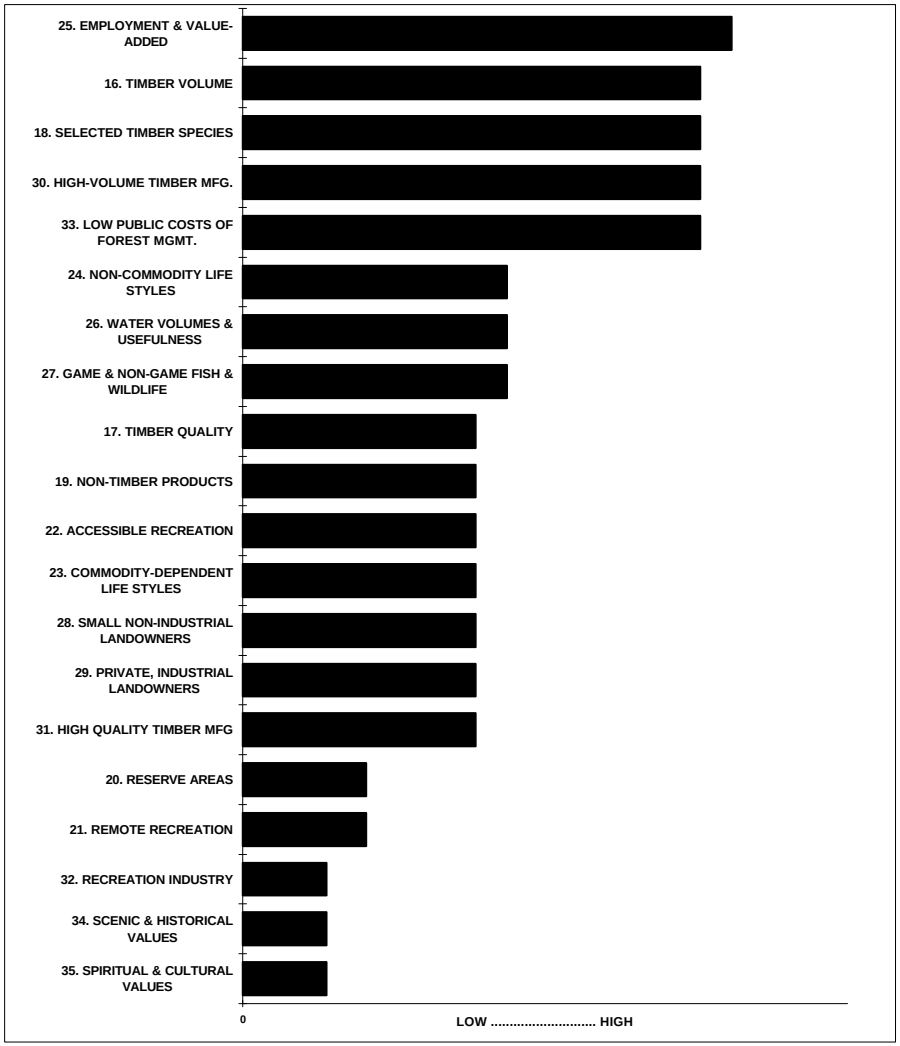


FIGURE 2.2.2B. UNITED STATES: EFFECT OF POLICY OPTION #2 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.3. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #3.

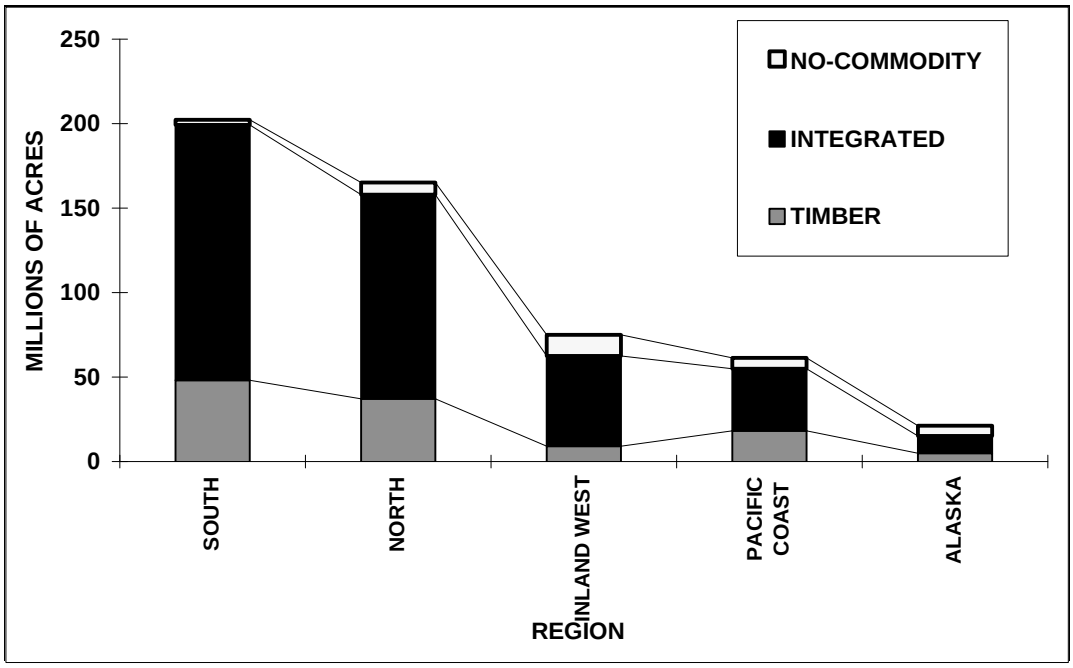


TABLE 2.3. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #3

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	18.3	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	222	129
LUMBER & WOOD PRODUCTS	1,097	752
PAPER & ALLIED PRODUCTS	768	691
CARPENTERS	1,408	1,255
INDIRECT	3,495	2,827
TOTAL	6,990	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	2.0	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	5.0	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	44.2	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	117	404
INTEGRATED AREA		
(millions of acres)	372	85
NON-COMMODITY AREA		
(millions of acres)	36	36

1 Does not include income generated from recreation. See text for details.

2 Estimated by this strategy. See text for assumptions.

3 Many values estimated from Table 1.6.

TABLE 2.3.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #3. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	0	10	0	10
Other Public	21	0	0	21
Forest Industry	16	0	0	16
Nonindustrial private	0	111	0	111
All Ownerships	37	121	8	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	0	12	0	12
Other Public	9	0	0	9
Forest Industry	39	0	0	39
Nonindustrial private	0	140	0	140
All Ownerships	48	151	3	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	0	36	0	36
Other Public	6	0	0	6
Forest Industry	3	0	0	3
Nonindustrial private	0	17	0	17
All Ownerships	9	54	12	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	0	23	0	23
Other Public	6	0	0	6
Forest Industry	12	0	0	12
Nonindustrial private	0	13	0	13
All Ownerships	18	36	7	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	0	4	0	4
Other Public	5	0	0	5
Forest Industry	0	0	0	0
Nonindustrial private	0	6	0	6
All Ownerships	5	10	6	21

FIGURE 2.3.2A. UNITED STATES--EFFECT OF POLICY OPTION #3 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

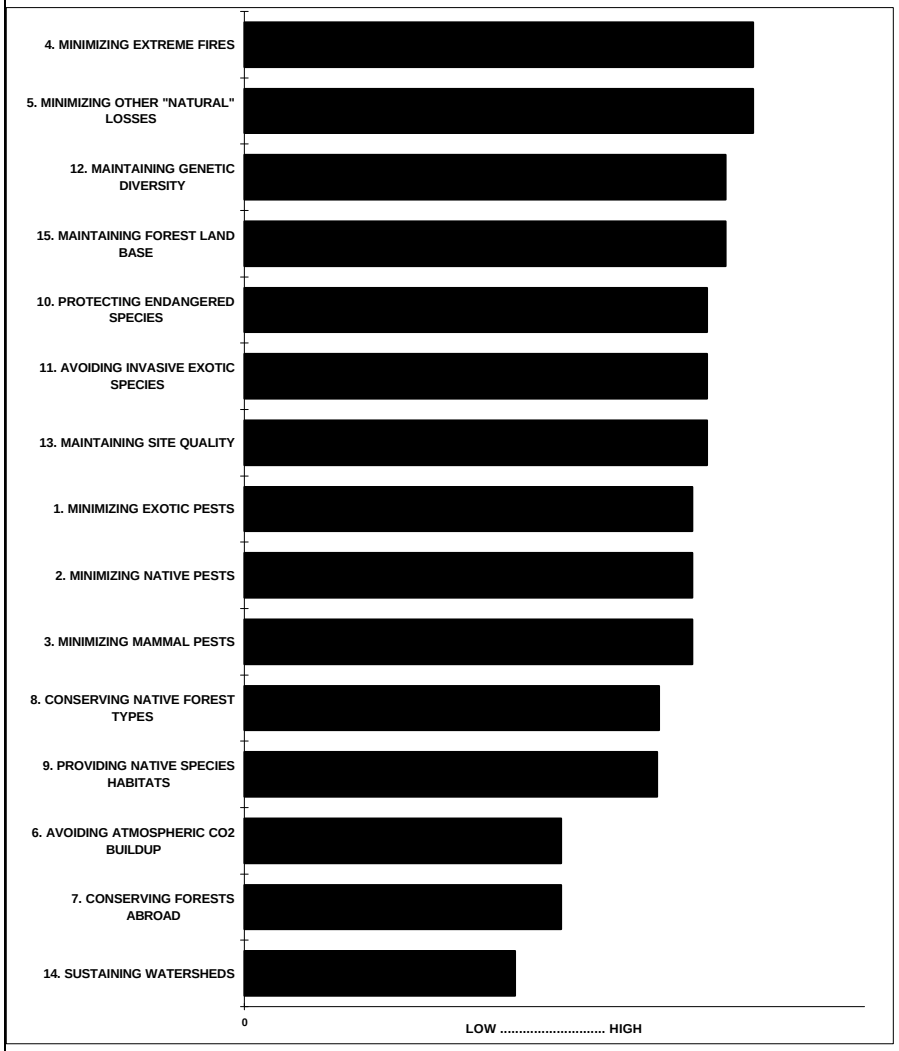
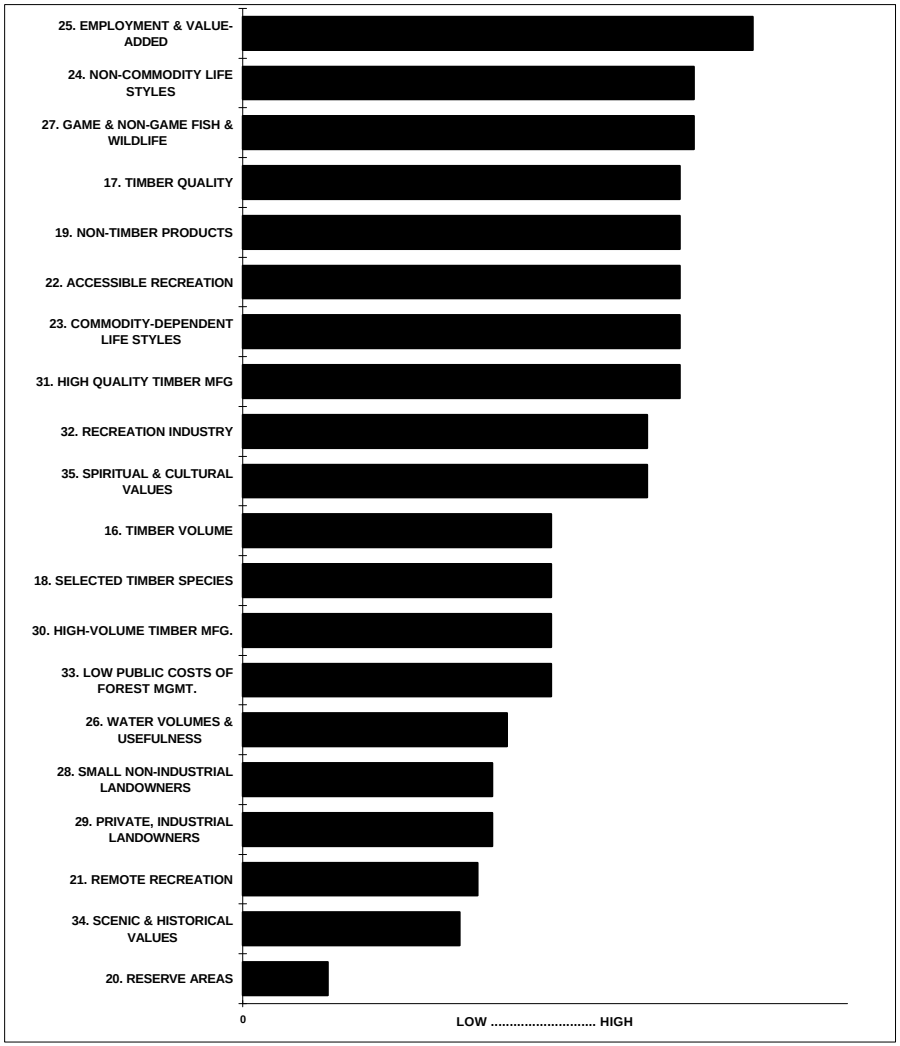


FIGURE 2.3.2B. UNITED STATES: EFFECT OF POLICY OPTION #3 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.4. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #4.

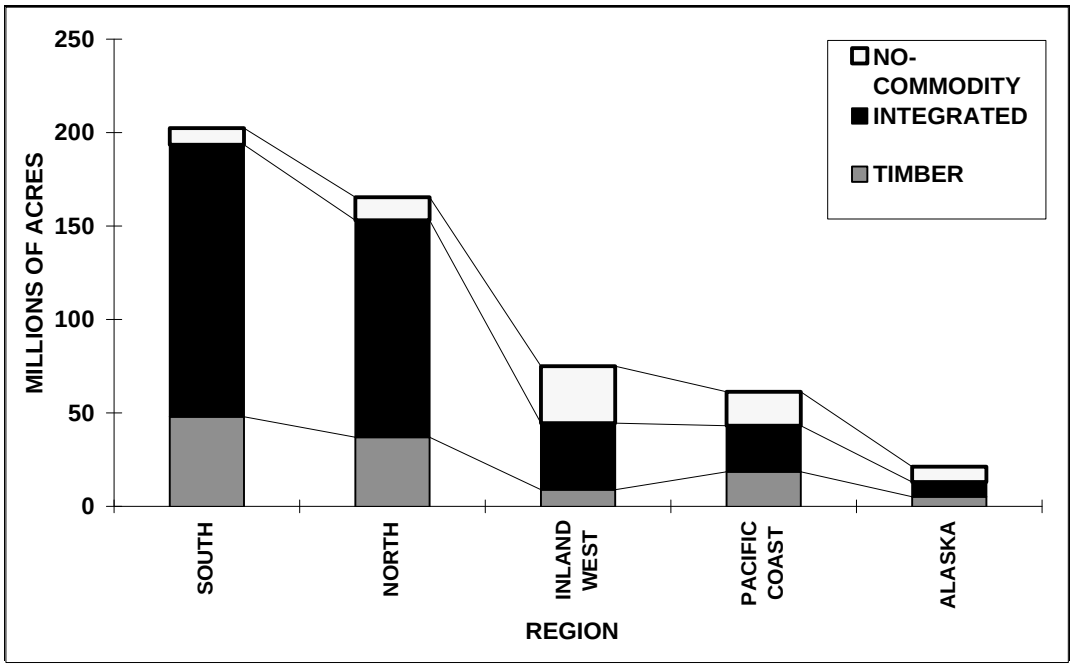


TABLE 2.4. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #4

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	16.7	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	200	129
LUMBER & WOOD PRODUCTS	990	752
PAPER & ALLIED PRODUCTS	701	691
CARPENTERS	1,284	1,255
INDIRECT	3,176	2,827
TOTAL	6,352	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	0.4	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	4.6	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	31.2	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	117	404
INTEGRATED AREA		
(millions of acres)	330	85
NON-COMMODITY AREA		
(millions of acres)	78	36

1 Does not include income generated from recreation. See text for details.

2 Estimated by this strategy. See text for assumptions.

3 Many values estimated from Table 1.6.

TABLE 2.4.1. AREA UNDER EACH MANAGEMENT APPROACH BY

acres)

	TIMBER		NO-COMMODITY	TOTAL
NORTH				
	0	**0**		**8**
		5	**5**	
Other Public		**0**	**0**	
Forest Industry		**0**	**0**	
Nonindustrial private		**111**	**0**	
All Ownerships		**116**	**12**	
SOUTH				
		0	**3**	
National Forests		**6**	**6**	
Other Public		**0**	**0**	
Forest Industry		**0**	**0**	
Nonindustrial private		**140**	**0**	
All Ownerships		**146**	**9**	
INLAND WEST				
Present, prod. reserves	**0**	**0**	**12**	**12**
	0	**18**		**36**
		0	**0**	
Forest Industry		**0**	**0**	
Nonindustrial private		**17**	**0**	
All Ownerships		**36**	**30**	
PACIFIC COAST				
Present, prod. reserves	**0**	**0**	**7**	**7**
	0	**12**		**23**
		0	**0**	
Forest Industry		**0**	**0**	
Nonindustrial private		**13**	**0**	
All Ownerships		**25**	**18**	
ALASKA				
Present, prod. reserves	**0**	**0**	**6**	**6**
	0	**2**		**4**
		0	**0**	
Forest Industry		**0**	**0**	
Nonindustrial private		**6**	**0**	
All Ownerships		**8**	**8**	

FIGURE 2.4.2A. UNITED STATES--EFFECT OF POLICY OPTION #4 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

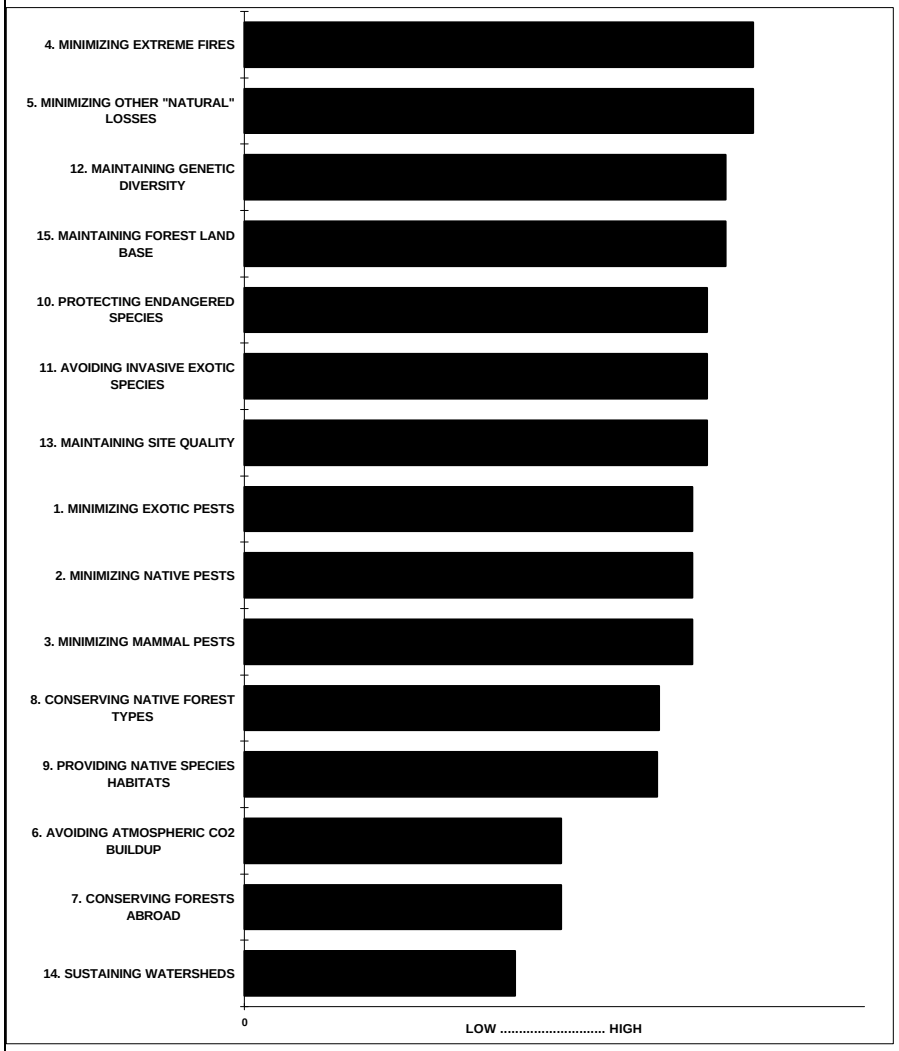
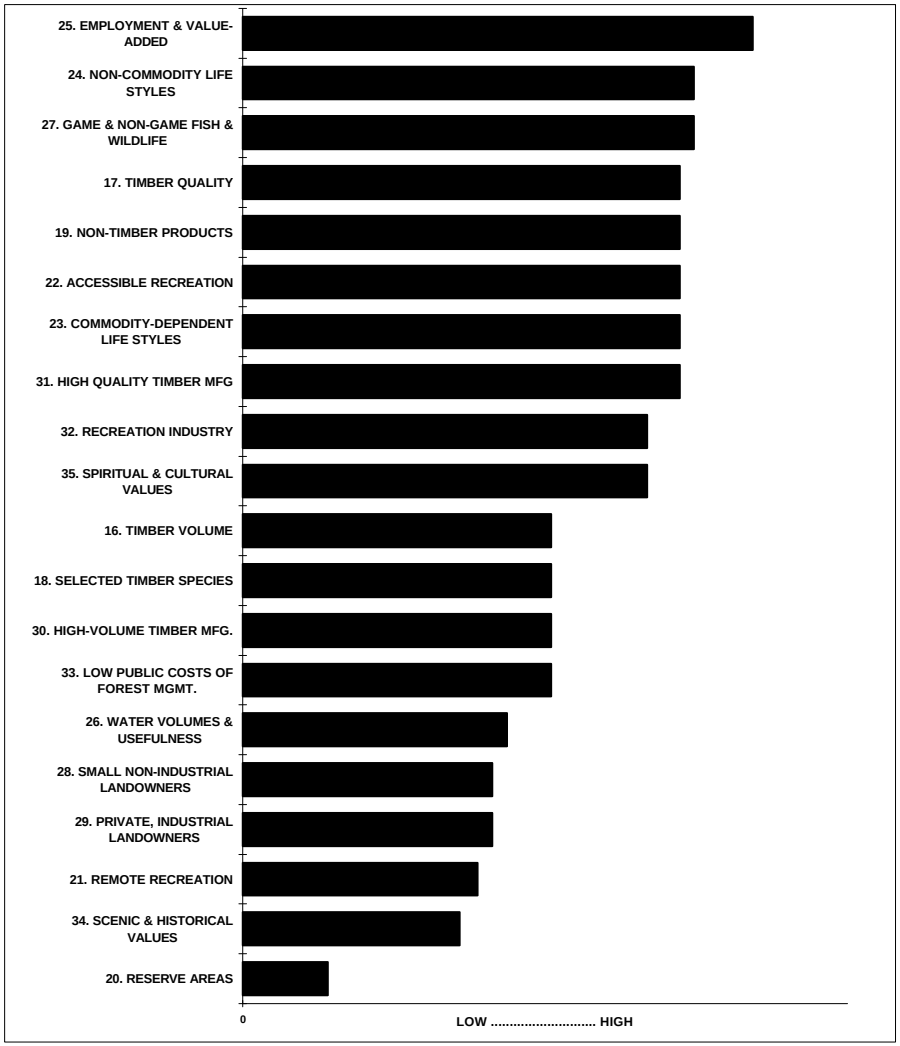


FIGURE 2.4.2B. UNITED STATES: EFFECT OF POLICY OPTION #4 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.5. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #5.

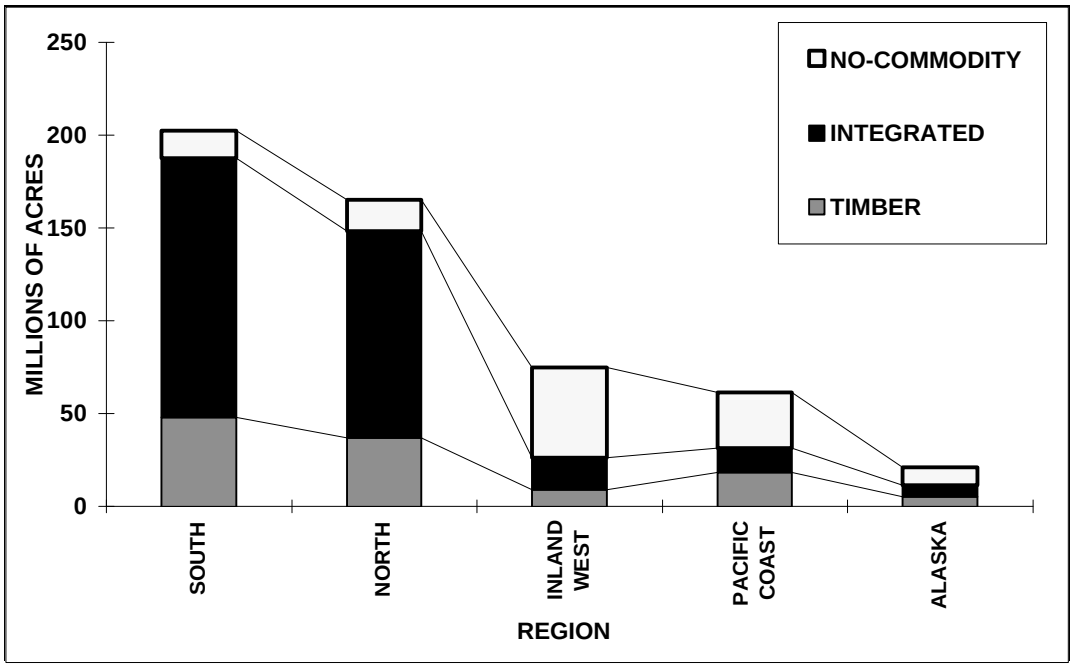


TABLE 2.5. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #5

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	15.1	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	179	129
LUMBER & WOOD PRODUCTS	884	752
PAPER & ALLIED PRODUCTS	633	691
CARPENTERS	1,161	1,255
INDIRECT	2,857	2,827
TOTAL	5,714	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	-1.2	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	4.2	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	18.2	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	117	404
INTEGRATED AREA		
(millions of acres)	288	85
NON-COMMODITY AREA		
(millions of acres)	120	36

1 Does not include income generated from recreation. See text for details.

2 Estimated by this strategy. See text for assumptions.

3 Many values estimated from Table 1.6.

TABLE 2.5.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #5. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	0	0	10	10
Other Public	21	0	0	21
Forest Industry	16	0	0	16
Nonindustrial private	0	111	0	111
All Ownerships	37	111	17	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	0	0	12	12
Other Public	9	0	0	9
Forest Industry	39	0	0	39
Nonindustrial private	0	140	0	140
All Ownerships	48	140	15	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	0	0	36	36
Other Public	6	0	0	6
Forest Industry	3	0	0	3
Nonindustrial private	0	17	0	17
All Ownerships	9	17	49	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	0	0	23	23
Other Public	6	0	0	6
Forest Industry	12	0	0	12
Nonindustrial private	0	13	0	13
All Ownerships	18	13	30	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	0	0	4	4
Other Public	5	0	0	5
Forest Industry	0	0	0	0
Nonindustrial private	0	6	0	6
All Ownerships	5	6	10	21

FIGURE 2.5.2A. UNITED STATES--EFFECT OF POLICY OPTION #5 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

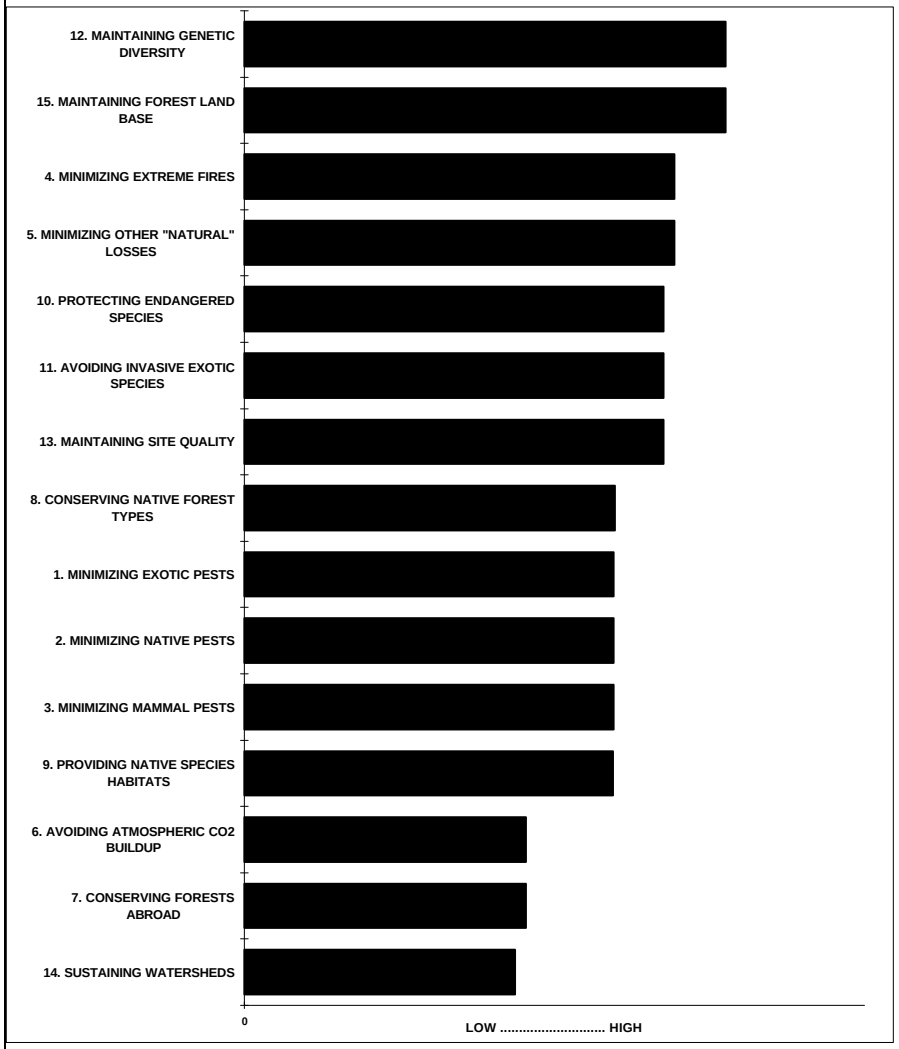
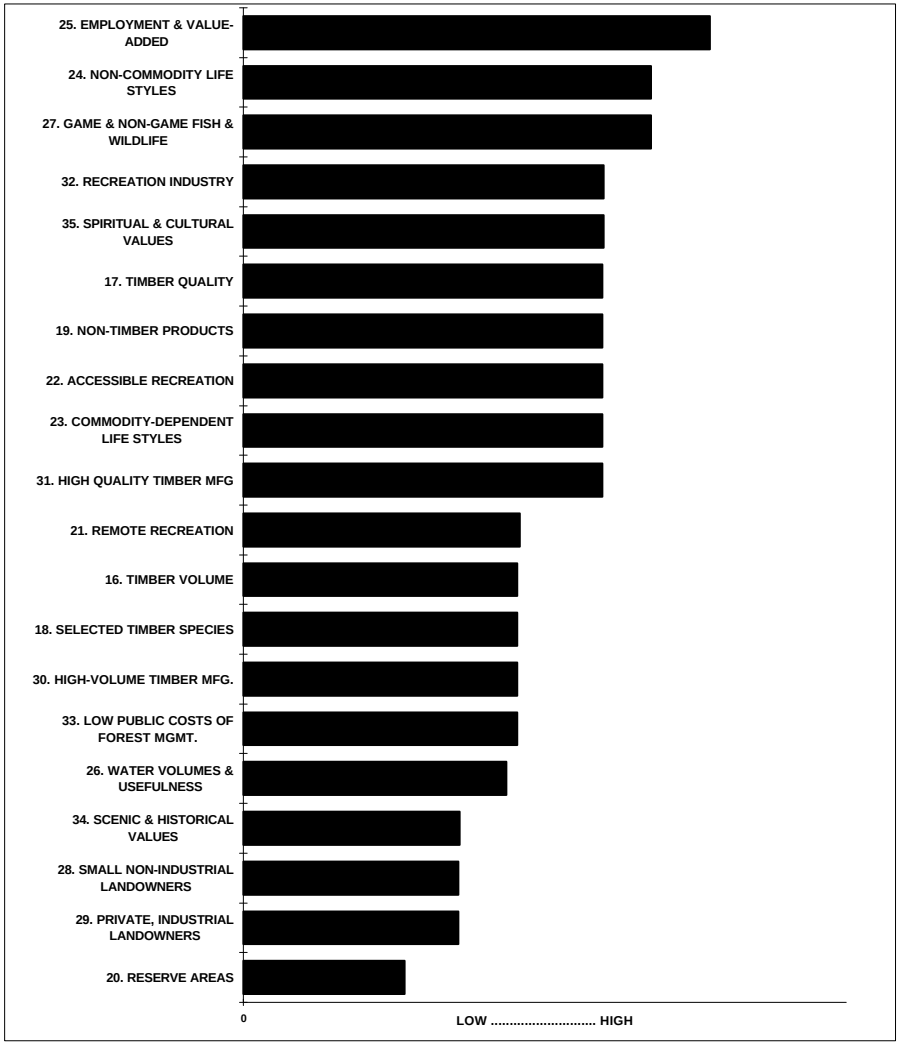


FIGURE 2.5.2B. UNITED STATES: EFFECT OF POLICY OPTION #5 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.6. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #6.

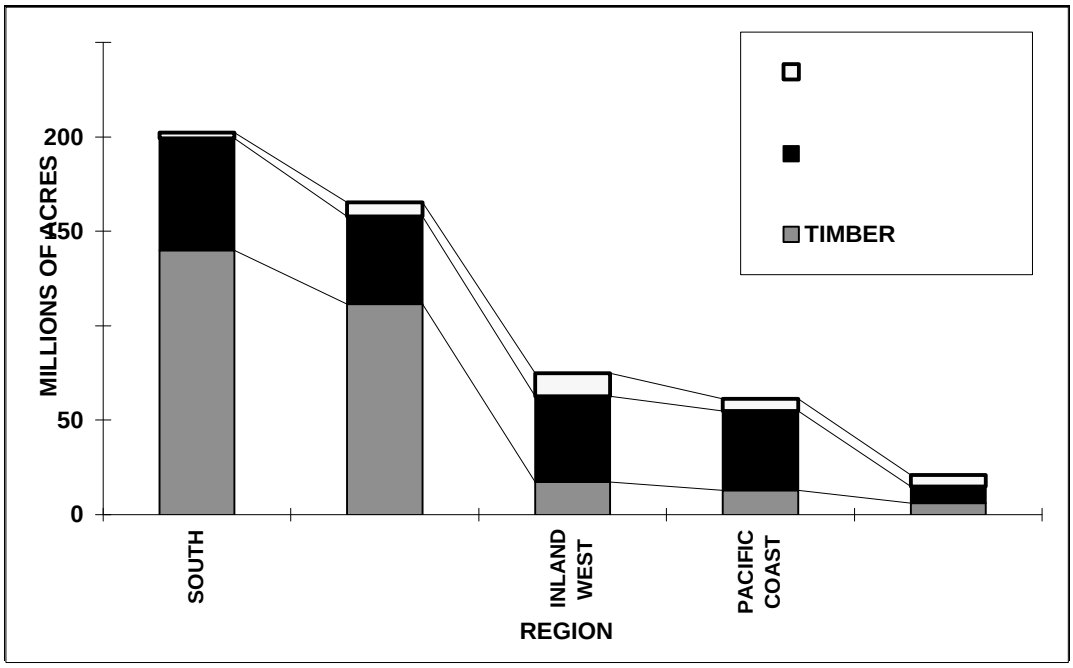


TABLE 2.6. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #6

	[2]	[3]
TIMBER HARVEST VOLUME		
	19.2	**16.3**
FORESTRY & LOGGING	**188**	**129**
	1,010	
PAPER & ALLIED PRODUCTS	**805**	
CARPENTERS	**1,476**	
INDIRECT	**3,479**	
TOTAL	**6,957**	
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)		**0.0**
PUBLIC COST OF MANAGEMENT		
	4.2	**3.6**
(billions of dollars)[1]		**19.8**
TIMBER MANAGEMENT AREA		
(millions of acres)		**404**
(millions of acres)	**202**	
NON-COMMODITY AREA		
(millions of acres)	**36**	

1 Does not include income generated from recreation. See text for details.
2 Estimated by this strategy. See text for assumptions.
3 Many values estimated from Table 1.6.

TABLE 2.6.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #6. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	0	10	0	10
Other Public	0	21	0	21
Forest Industry	0	16	0	16
Nonindustrial private	111	0	0	111
All Ownerships	111	47	8	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	0	12	0	12
Other Public	0	9	0	9
Forest Industry	0	39	0	39
Nonindustrial private	140	0	0	140
All Ownerships	140	60	3	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	0	36	0	36
Other Public	0	6	0	6
Forest Industry	0	3	0	3
Nonindustrial private	17	0	0	17
All Ownerships	17	45	12	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	0	23	0	23
Other Public	0	6	0	6
Forest Industry	0	12	0	12
Nonindustrial private	13	0	0	13
All Ownerships	13	42	7	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	0	4	0	4
Other Public	0	5	0	5
Forest Industry	0	0	0	0
Nonindustrial private	6	0	0	6
All Ownerships	6	9	6	21

FIGURE 2.6.2A. UNITED STATES--EFFECT OF POLICY OPTION #6 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

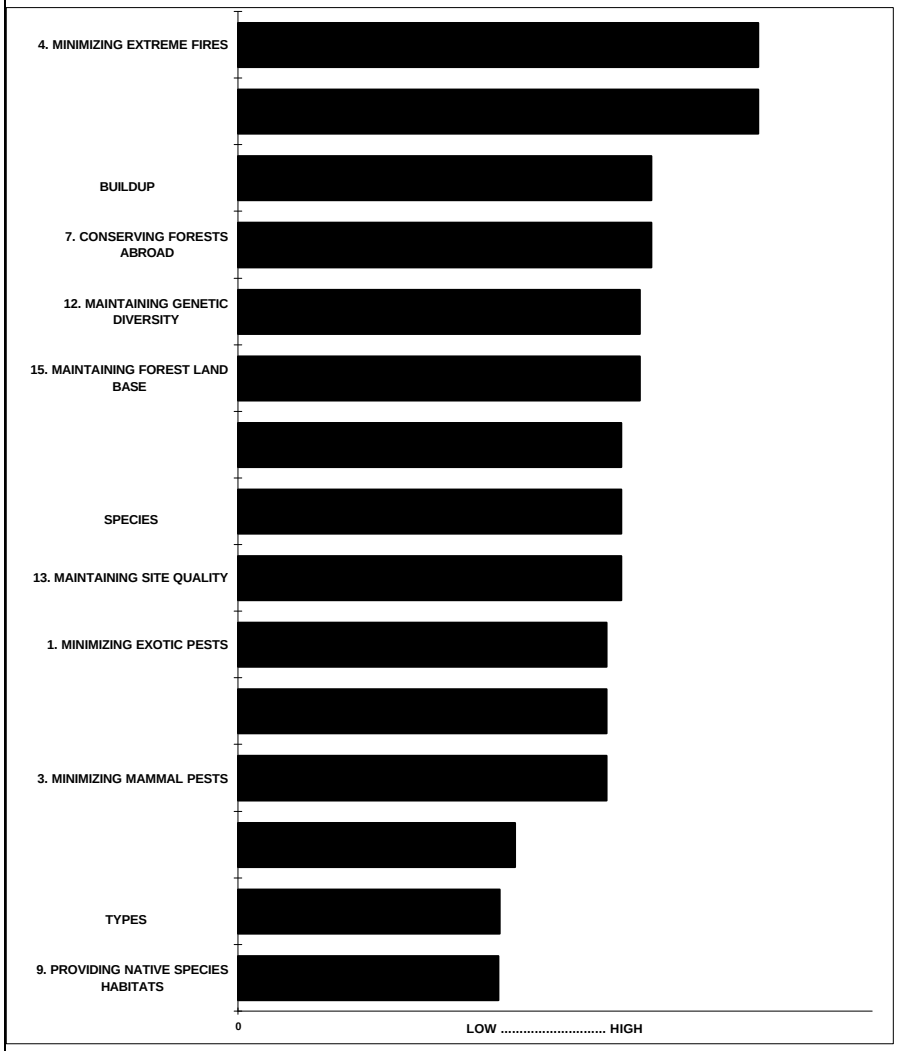
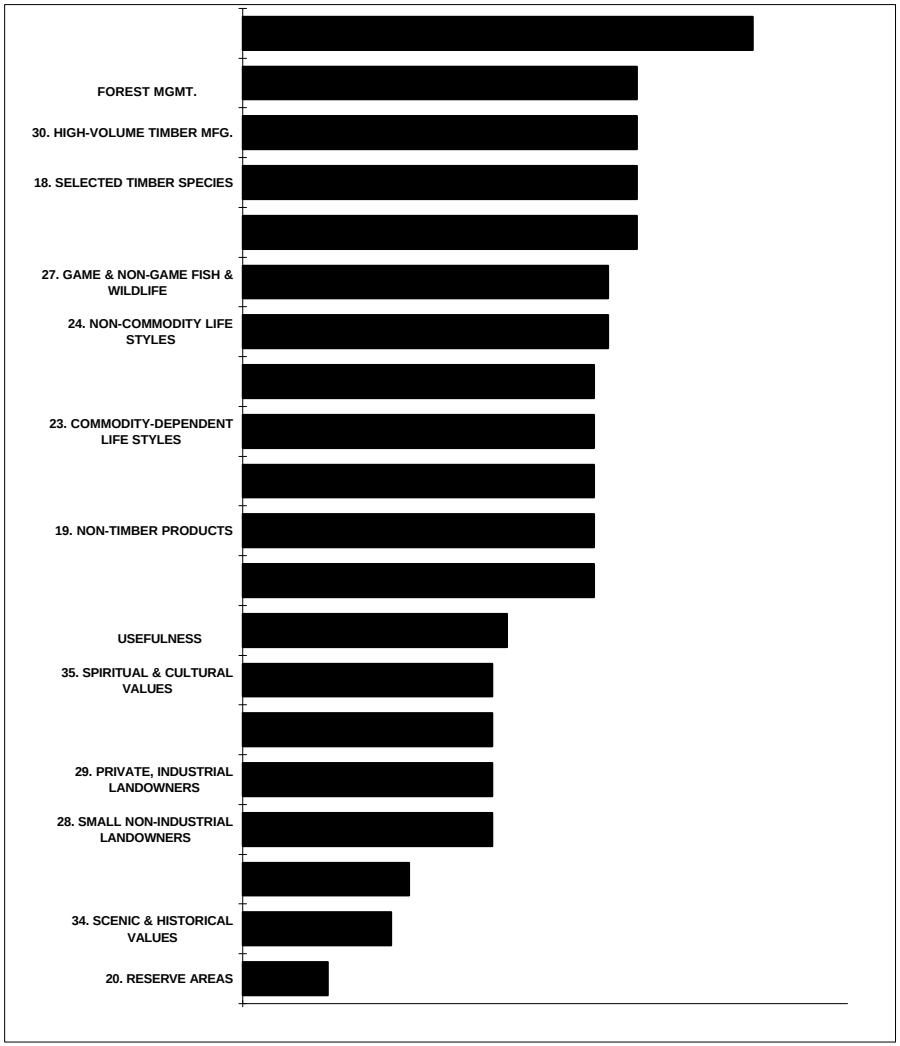


FIGURE 2.6.2B. UNITED STATES: EFFECT OF POLICY OPTION #6 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.7. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #7.

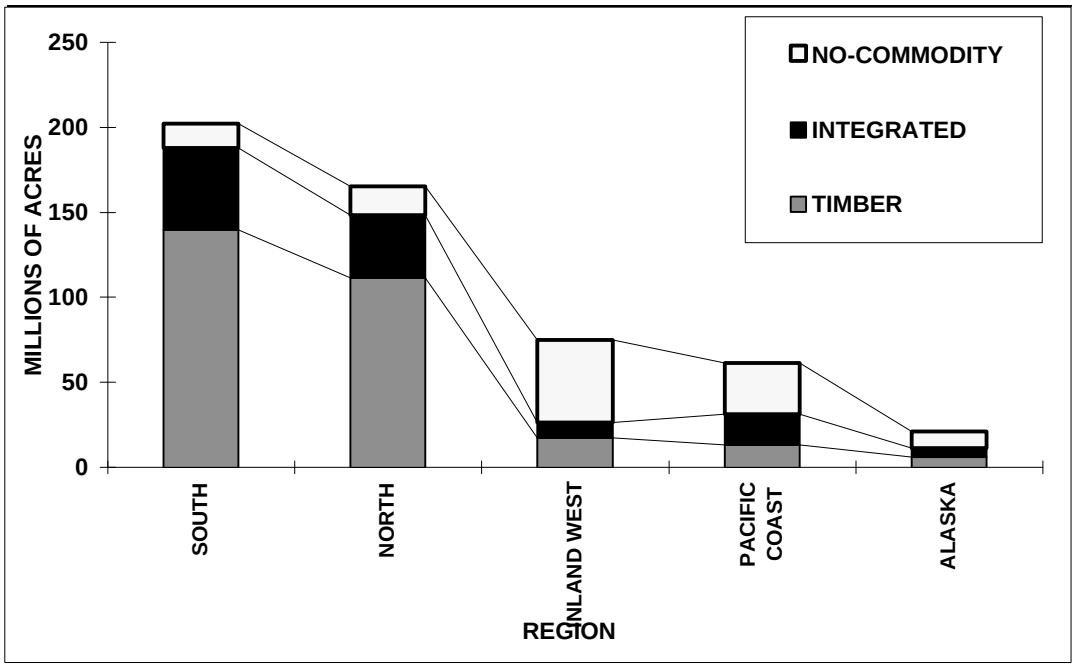


TABLE 2.7. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #7

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	15.9	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	145	
LUMBER & WOOD PRODUCTS	798	
PAPER & ALLIED PRODUCTS	670	
CARPENTERS	1,228	
INDIRECT	2,841	
TOTAL	5,681	
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)		0.0
PUBLIC COST OF MANAGEMENT		
	3.3	3.6
(billions of dollars)[1]		19.8
TIMBER MANAGEMENT AREA		
(millions of acres)		404
(millions of acres)	117	
NON-COMMODITY AREA		
(millions of acres)	120	

1 Does not include income generated from recreation. See text for details.
2 Estimated by this strategy. See text for assumptions.
3 Many values estimated from Table 1.6.

TABLE 2.7.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #7. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	0	0	10	10
Other Public	0	21	0	21
Forest Industry	0	16	0	16
Nonindustrial private	111	0	0	111
All Ownerships	111	37	17	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	0	0	12	12
Other Public	0	9	0	9
Forest Industry	0	39	0	39
Nonindustrial private	140	0	0	140
All Ownerships	140	48	15	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	0	0	36	36
Other Public	0	6	0	6
Forest Industry	0	3	0	3
Nonindustrial private	17	0	0	17
All Ownerships	17	9	49	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	0	0	23	23
Other Public	0	6	0	6
Forest Industry	0	12	0	12
Nonindustrial private	13	0	0	13
All Ownerships	13	18	30	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	0	0	4	4
Other Public	0	5	0	5
Forest Industry	0	0	0	0
Nonindustrial private	6	0	0	6
All Ownerships	6	5	10	21

FIGURE 2.7.2A. UNITED STATES--EFFECT OF POLICY OPTION #7 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

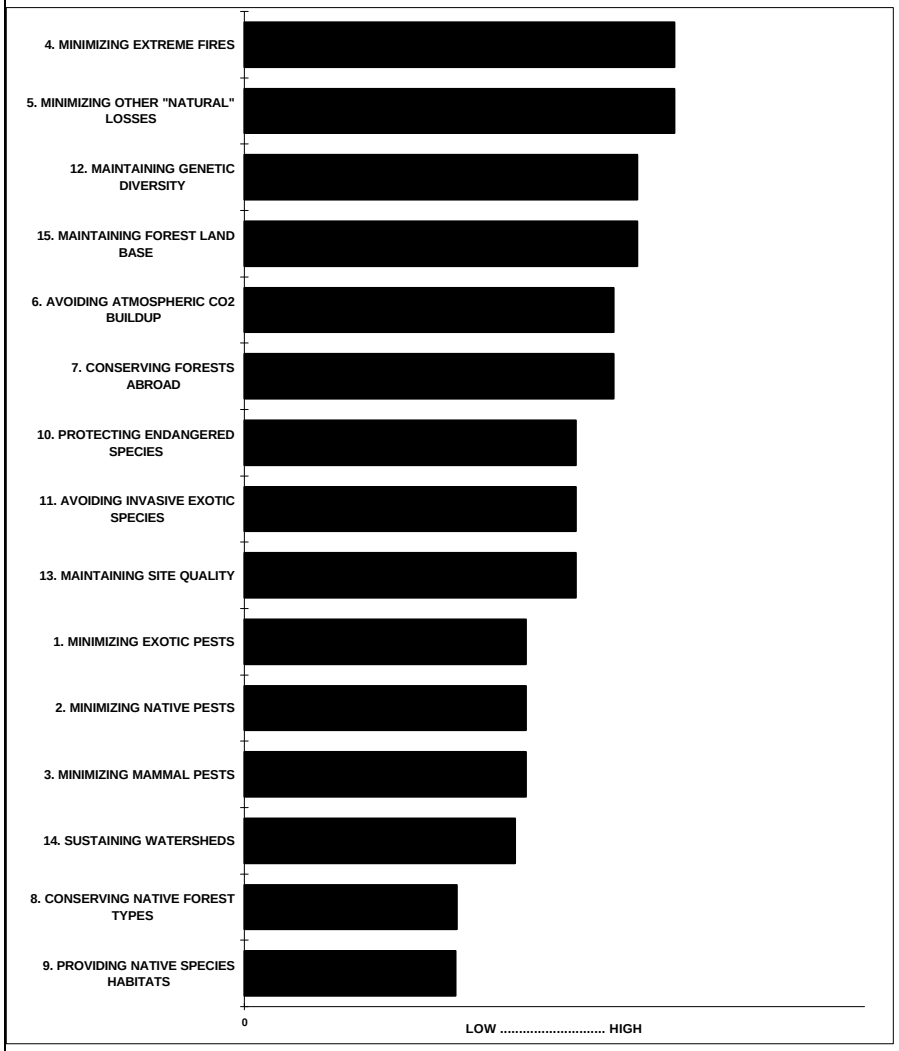
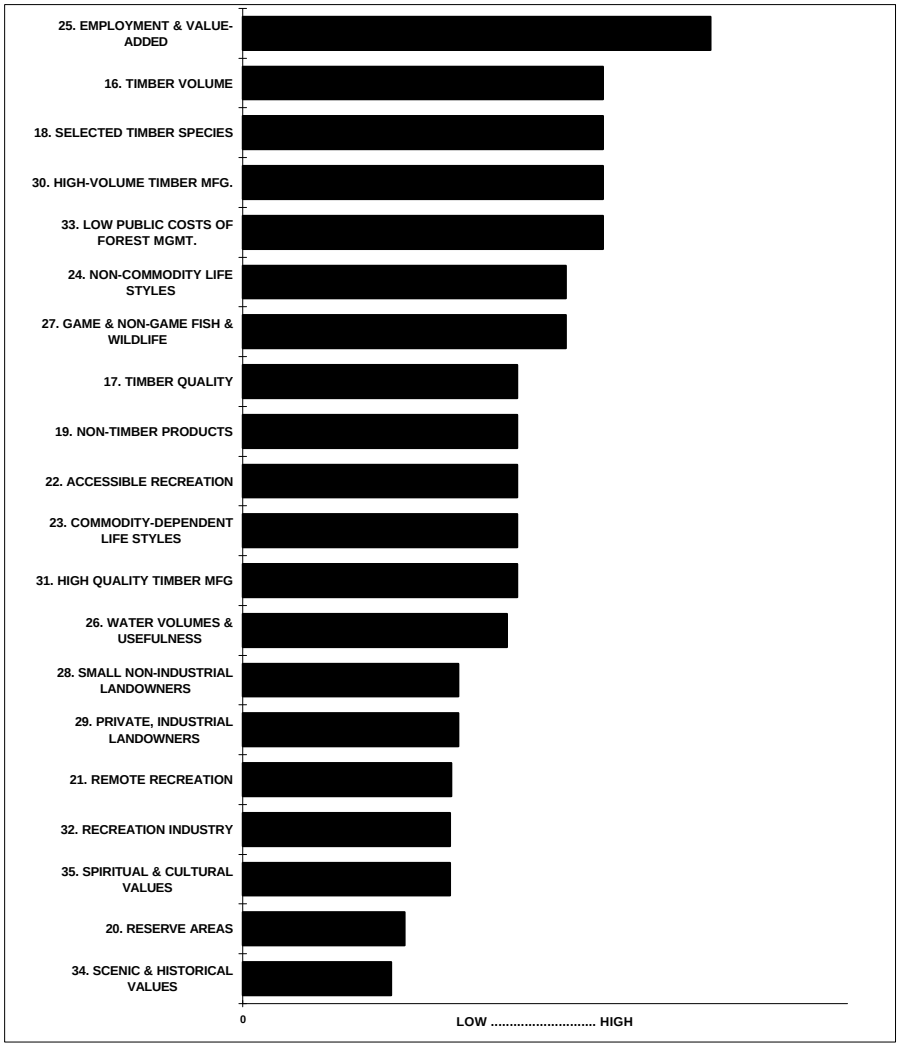


FIGURE 2.7.2B. UNITED STATES: EFFECT OF POLICY OPTION #7 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.

FIGURE 2.8. AREA UNDER MANAGEMENT BY REGION FOR POLICY OPTION #8.

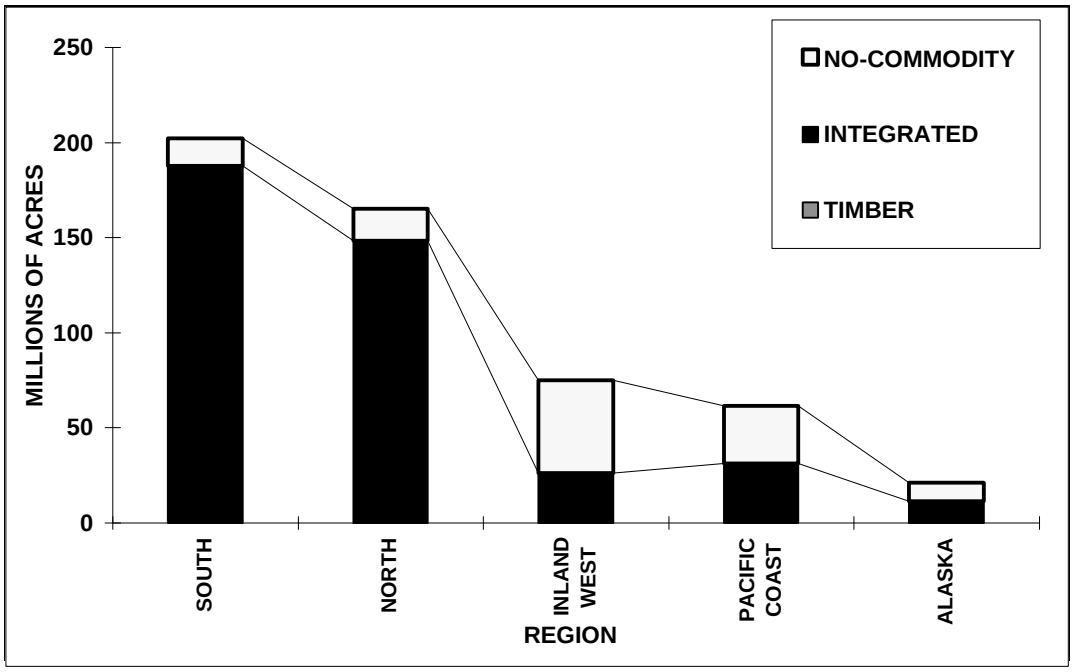


TABLE 2.8. SUMMARY INFORMATION FOR UNITED STATES RELATIVE TO POLICY OPTION #8

	PROJECTED[2]	PRESENT[3]
TIMBER HARVEST VOLUME		
(billion FT3/year)	14.4	16.3
EMPLOYMENT (thousands of people)		
FORESTRY & LOGGING	205	129
LUMBER & WOOD PRODUCTS	951	752
PAPER & ALLIED PRODUCTS	605	691
CARPENTERS	1,109	1,255
INDIRECT	2,869	2,827
TOTAL	5,738	5,654
NET TIMBER EXPORT(+) OR IMPORT (-)		
(billion FT3/year)	-1.9	0.0
PUBLIC COST OF MANAGEMENT		
(billions of dollars)	4.8	3.6
PUBLIC RETURN FROM MANAGEMENT		
(billions of dollars)[1]	17.4	19.8
TIMBER MANAGEMENT AREA		
(millions of acres)	0	404
INTEGRATED AREA		
(millions of acres)	405	85
NON-COMMODITY AREA		
(millions of acres)	120	36

1 Does not include income generated from recreation. See text for details.

2 Estimated by this strategy. See text for assumptions.

3 Many values estimated from Table 1.6.

TABLE 2.8.1. AREA UNDER EACH MANAGEMENT APPROACH BY REGION & OWNERSHIP FOR POLICY OPTION #8. (Millions of acres)

	TIMBER	INTEGRATED	NO-COMMODITY	TOTAL
NORTH				
Present, prod. reserves	0	0	8	8
National Forests	0	0	10	10
Other Public	0	21	0	21
Forest Industry	0	16	0	16
Nonindustrial private	0	111	0	111
All Ownerships	0	148	17	165
SOUTH				
Present, prod. reserves	0	0	3	3
National Forests	0	0	12	12
Other Public	0	9	0	9
Forest Industry	0	39	0	39
Nonindustrial private	0	140	0	140
All Ownerships	0	188	15	202
INLAND WEST				
Present, prod. reserves	0	0	12	12
National Forests	0	0	36	36
Other Public	0	6	0	6
Forest Industry	0	3	0	3
Nonindustrial private	0	17	0	17
All Ownerships	0	26	49	75
PACIFIC COAST				
Present, prod. reserves	0	0	7	7
National Forests	0	0	23	23
Other Public	0	6	0	6
Forest Industry	0	12	0	12
Nonindustrial private	0	13	0	13
All Ownerships	0	31	30	61
ALASKA				
Present, prod. reserves	0	0	6	6
National Forests	0	0	4	4
Other Public	0	5	0	5
Forest Industry	0	0	0	0
Nonindustrial private	0	6	0	6
All Ownerships	0	11	10	21

FIGURE 2.8.2A. UNITED STATES--EFFECT OF POLICY OPTION #8 ON POTENTIAL TO ACHIEVE CONDITIONS FROM TABLE 1.1A.

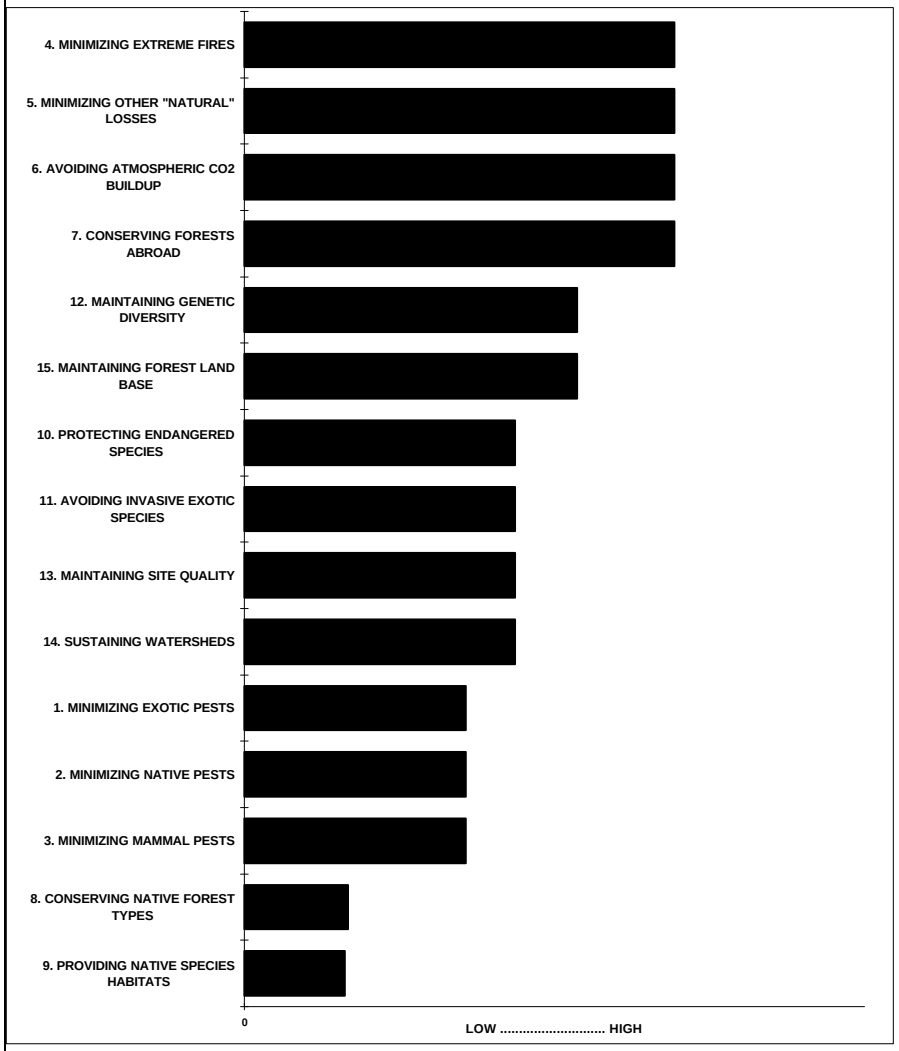
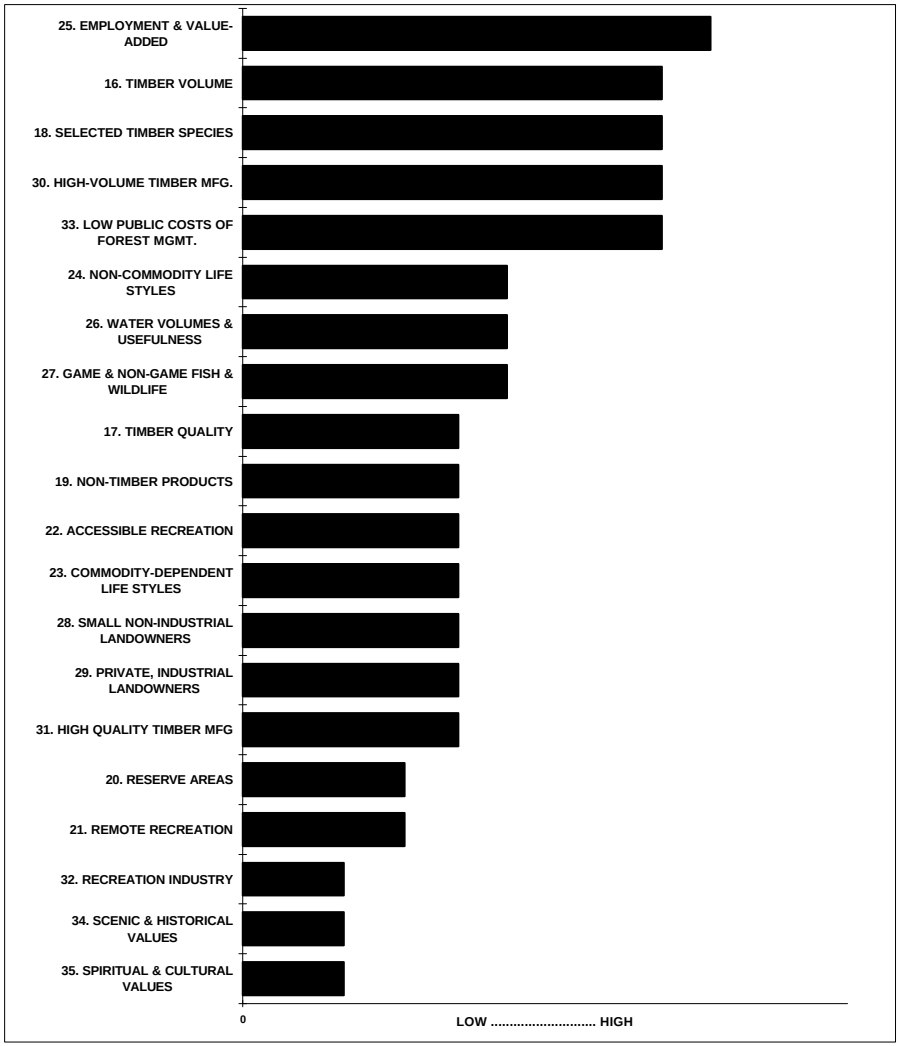


FIGURE 2.8.2B. UNITED STATES: EFFECT OF POLICY OPTION #8 ON THE FOREST'S POTENTIAL TO PROVIDE VARIOUS VALUES FROM TABLE 1.1B.



VALUE WEIGHTED BY REGION'S FOREST AREA; RANKED FROM HIGHEST TO LOWEST CONTRIBUTION.